

# Briarfield Watershed Management Plan

City of Hampton, VA

2016.06.17

Final Report



# **Briarfield Watershed Management Plan**

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**Final Report**

**June 17, 2016**

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## List of Acronyms

BMP	Best Management Practices
CBF	Chesapeake Bay Foundation
CCI	Community Character Information
CIP	Capital Improvement Program
CWP	Center for Watershed Protection
CZMA	Coastal Zone Management Act
DCR	Department of Conservation and Recreation
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
FY	Fiscal Year
GIS	Geographic Information System
HRPDC	Hampton Roads Planning District Commission
IDA	Intensely Developed Area
LEED	Leadership in Energy and Environmental Design
MS4	Municipal Separate Storm Sewer System
N (TN)	Nitrogen (Total Nitrogen)
NDZ	No Discharge Zone
NGO	Non-Governmental Organization
NPDES	National Pollutant Discharge Elimination System
P (TP)	Phosphorous (Total Phosphorous)
RPA	Resource Protection Area
RRM	Runoff Reduction Method
SSO	Sanitary Sewer Overflow
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
VA	Virginia
VAMSA	Virginia Municipal Stormwater Association
VAST	Virginia Assessment and Scenario Tool
VBMP	Virginia Base Mapping Program
VCMP	Virginia Clean Marina Program
VDH	Virginia Department of Health
VIMS	Virginia Institute of Marine Science
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WLA	Waste Load Allocation
WIP	Watershed Implementation Plan
WOUS	Waters of the United States
WTM	Watershed Treatment Model

## EXECUTIVE SUMMARY

The City of Hampton is currently participating in various Federal, State and Local stormwater management programs and is in the process of evaluating its stormwater systems City-wide to determine if these systems can be improved in a cost effective manner to meet program requirements. The stormwater infrastructure is also being evaluated to determine if improvements can be made to alleviate localized flooding as an additional project benefit.

The purpose of this watershed management plan is to provide a recommended set of actions to assist the City with its stormwater management strategies for the Briarfield Watershed which is a 1,400 acre sub-watershed in the larger Newmarket Creek-Back River watershed.

The existing conditions within the watershed were evaluated, projects identified, design and cost details developed and on-site evaluations conducted to determine overall project feasibility. Proposed projects were also evaluated with a hydrologic model developed to evaluate the significance of any relief to local flood prone areas. Several projects were recommended for inclusion in the overall watershed plan as follows:

Location	Description	Proposed Practice	Cost	Pollutant Removals (lb/year)			\$/lb P	Additional Flood Reduction Benefits
				N	P	SS		
A	Briarfield Park	Level I Constructed Wetland	\$ 356,000	32.15	8.99	2959.00	\$39,600	
B	Cesar Tarrant Elementary School (CLOSED)	Level I Constructed Wetland (x2)	\$ 258,000	14.47	4.05	1252.91	\$63,800	
D	Aberdeen Rd Disconnect - Upstream	Level I Wet Pond	\$1,466,000	66.7	20.98	6357.95	\$69,900	Reduces Flooding From Aberdeen System
E	Lindsay Middle School & West Hampton Community Center	Level I Constructed Wetland	\$ 399,000	31.88	8.91	2838.92	\$44,800	
F	Robert E. Lee Elementary School	Level I Bioretention Basin	\$ 267,000	63.71	4.9	1614.87	\$54,500	
G	Tidal Ditch Improvements	Shoreline Management Sedimentation (Constructed Tidal Wetlands)	\$ 266,000	N/A	5.584	7347.15	\$47,700	
H	Hampton High School	Level I Constructed Wetland	\$ 700,000	149.67	41.84	12432.98	\$16,800	
I	W Queen Street Storm System Improvements	Flood Alleviation	\$ 168,000	N/A	N/A	N/A	N/A	Reduces Underpass Flooding
J	Hampton High School	Level I Wet Pond	\$ 276,000	25.00	7.86	2398.50	\$35,200	

Detailed project information was developed and is provided in the project details located in Appendix C. This matrix has been prepared with significant information geared towards assisting the City in prioritizing projects, developing CIP information and assist with if and when to move forward with pursuing funding and grant opportunities.

## **1.0 Introduction and Background**

### **1.1 Project Purpose**

The City of Hampton is in the process of evaluating the existing stormwater infrastructure in its watersheds to determine if the conveyance systems can be improved to cost effectively convey stormwater in a manner which alleviates or reduces flooding while providing pollutant removal in order to meet its MS4 permit, Chesapeake Bay TMDL and other program requirements.

This watershed management plan provides recommended stormwater systems actions to assist the City in its strategy for improving the stormwater systems in the Briarfield Watershed. This plan assessed the watershed's existing stormwater infrastructure, identified problem areas, and presents recommendations for projects to improve water quality and reduce flooding, and explores funding mechanisms for the projects.

Detailed information is provided in Appendix C for the City to consider stormwater projects and prioritize them with other CIP projects for making decisions on if and when to move forward for budgeting and inclusion in its Capital Improvement Plan.

### **1.2 Background and Regulatory Programs**

The City of Hampton is currently participating in several different stormwater management improvement plans as a result of various Federal, State and Local required programs. The City must comply with requirements of several different programs and this study provides information to assist the City in its decision making processes. Regulatory Programs include.

- MS4 Permit
- Virginia Stormwater Management Program
- Chesapeake Bay Preservation Area Program
- Chesapeake Bay TMDL Action Plan
- Back River and other TMDLS
- Newmarket Creek Agreement

Under the Chesapeake Bay TMDL Action plan the City must reduce its Phosphorus, Nitrogen, and Suspended Sediment loadings as well as identify and develop Back River TMDL implementation strategies to reduce bacterial loadings. The Virginia Department of Environmental Quality (DEQ) is currently developing a bacterial TMDL for Back River including Newmarket Creek which is impaired for low dissolved oxygen and will have a TMDL by 2018. The Chesapeake Bay and Back River TMDL action plans that will be prepared by the City may include joint strategies and projects identified through this evaluation may benefit both plans.

In addition, the City has several on-going programs that will be supported by the results of this watershed study. The City established the Hampton Comprehensive Waterways Management Plan Steering Committee which developed a Comprehensive Waterway Management Plan to address tidal flooding, stormwater management, shoreline protection & waterways management and maintenance to optimize the waterway's overall benefits to the community.

The City also has an ongoing program to perform ecological restoration projects and to identify, prioritize and preserve sensitive ecological resources throughout the City. The enhancement of the natural environment to treat stormwater runoff and the preservation of highly functioning areas are cost effective ways of improving water quality and enhancing recreational and educational opportunities for city

residents. One of the primary components of this program is to develop a plan to identify prioritize restoration sites in each City watershed and to:

*“Prepare preliminary designs for the restoration of the sites that can be used to secure grant funding or prepare estimates for future Capital Improvement Project funding requests”.*

The results of this watershed study will assist the City with the implementation of these plans by addressing localized flooding, water quality and providing the necessary technical information to rank and prioritize sites.

### 1.2.1 Chesapeake Bay TMDL and Phase II WIP

The Clean Water Act requires that States set appropriate uses for their waters and adopt water quality standards that protect those uses. When waters do not meet these standards the Act requires that a total maximum daily load, (TMDL) or “pollution diet” must be established that sets the maximum amount of a pollutant a waterway can receive and still meet water quality standards. The Chesapeake Bay is not meeting water quality standards despite implementing various actions by the States over the last 30 years and has remained impaired. As a result, the U.S. Environmental Protection Agency (EPA) along with 6 States and the District of Columbia have established a TMDL for the Chesapeake Bay. This TMDL establishes the overall pollution loadings for the Bay and allocations for each state. Specifically, the TMDL sets Bay input limits that require a 25 percent reduction in nitrogen, 24 percent reduction in phosphorus and 20 percent reduction in sediment by 2025. These reductions are further allocated among the States which must develop a program for meeting their allocated reduction.

The Commonwealth of Virginia has developed and submitted its Phase I and Phase II Watershed Implementation Plans (WIPs) which provide the strategies by which States will reduce pollutant loadings to meet the allowed TMDL. One of the proposed WIP actions is to require the Municipal Separate Storm Sewer System (MS4) permits to achieve specified reductions in nitrogen, phosphorus and suspended solids loads from their regulated areas. The State will utilize its MS4 permit program to achieve nutrient and sediment reductions that equate to an average reduction of 9 percent of nitrogen loads, 16 percent of phosphorus loads, and 20 percent of sediment loads from impervious acreage and 6 percent of nitrogen loads, 7.25 percent of phosphorus loads and 8.75 percent sediment loads for pervious acreage from all of their regulated lands.

The City has developed its Local Phase II Watershed Implementation Plan to be utilized by the Commonwealth of Virginia in support of its Phase II WIP process. The report provides area-specific baseline data collection of best management practices (BMPs) implemented by the City. This effort provides a technical basis for improving the previously-developed TMDL assumptions and reduction targets. Additionally, the report outlined proposed strategies that may be utilized to meet established WLAs for nitrogen (N), phosphorous (P), and total suspended solids (TSS).

The City has already begun implementing plans to reduce its pollutant loading reduction requirements by developing projects and management strategies. Additionally, The VDEQ has offered stormwater project assistance through the Stormwater Local Assistance Funding Program (SLAF) to jumpstart project implementation. The City has taken advantage of this 50% matching program to implement projects even prior to knowing their true total reduction needs and continues to take advantage of these programs as they become available.

In 2017, the City will be required to submit a Phase III WIP that ensures it can meet required pollutant reductions by 2028. This watershed management plan is a critical element for identifying projects the City introduce to the CIP program. The City can either choose to move forward with one of the listed projects

or identify other projects to combine with for the most cost effective management strategy. This comprehensive approach will assist with reaching the pollutant reduction requirements outlined in the Phase II and Phase III WIP.

This study focuses on identifying solutions to reduce stormwater flooding and provide stormwater management facilities to assist the City in meeting required TMDL water quality goals. The study focuses on water quality improvements that both improve drainage and provide nutrient and sediment reductions to help the city meet the requirements of the Chesapeake Bay total maximum daily load (TMDL) Action Plan.

### 1.2.2 MS4 Permit

The City of Hampton has been designated as a Phase I MS4 community and is an existing Phase I MS4 permit holder. It must comply with the Commonwealth of Virginia's commitment to the Chesapeake Bay TMDL Watershed Implementation Plans (WIP I and II) to reduce phosphorus, nitrogen and suspended solids loadings to the Bay by 2028. The City has now been provided a new draft permit and once finalized will lay out the time line for achieving this goal. Along with the TMDL requirements, as part of this permit, the City is required to have a stormwater management program to reduce the contamination of stormwater runoff and eliminate illicit discharges. The MS4 permit contains six minimum control measures that must be implemented to achieve pollutant load reductions as follows:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention and Good Housekeeping

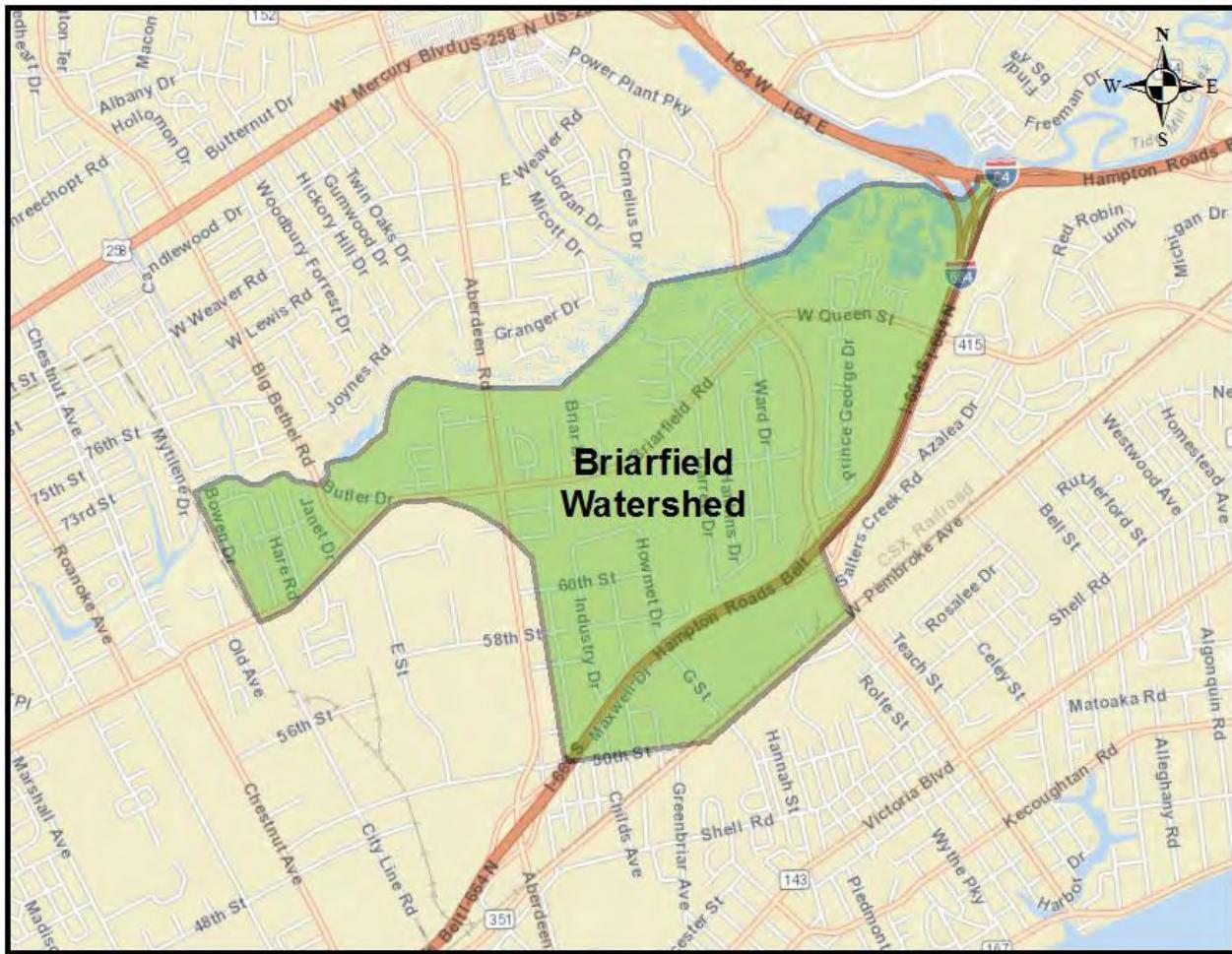
Conducting the watershed management study and implementing recommended projects will also help achieve the MS4 permit goals.

## 2.0 Watershed Overview

### 2.1 Watershed Description

The study area consists of the Briarfield Watershed which is a sub-watershed in the larger Newmarket Creek-Back River watershed. It is bordered by Newmarket Creek to the North and I-664 to the South and is traversed by Briarfield Boulevard which runs east to west through the central portion of the watershed. The watershed consists of approximately 1400 acres draining to Newmarket Creek as shown in Figure 2-1.

Figure 2-1. Briarfield Watershed

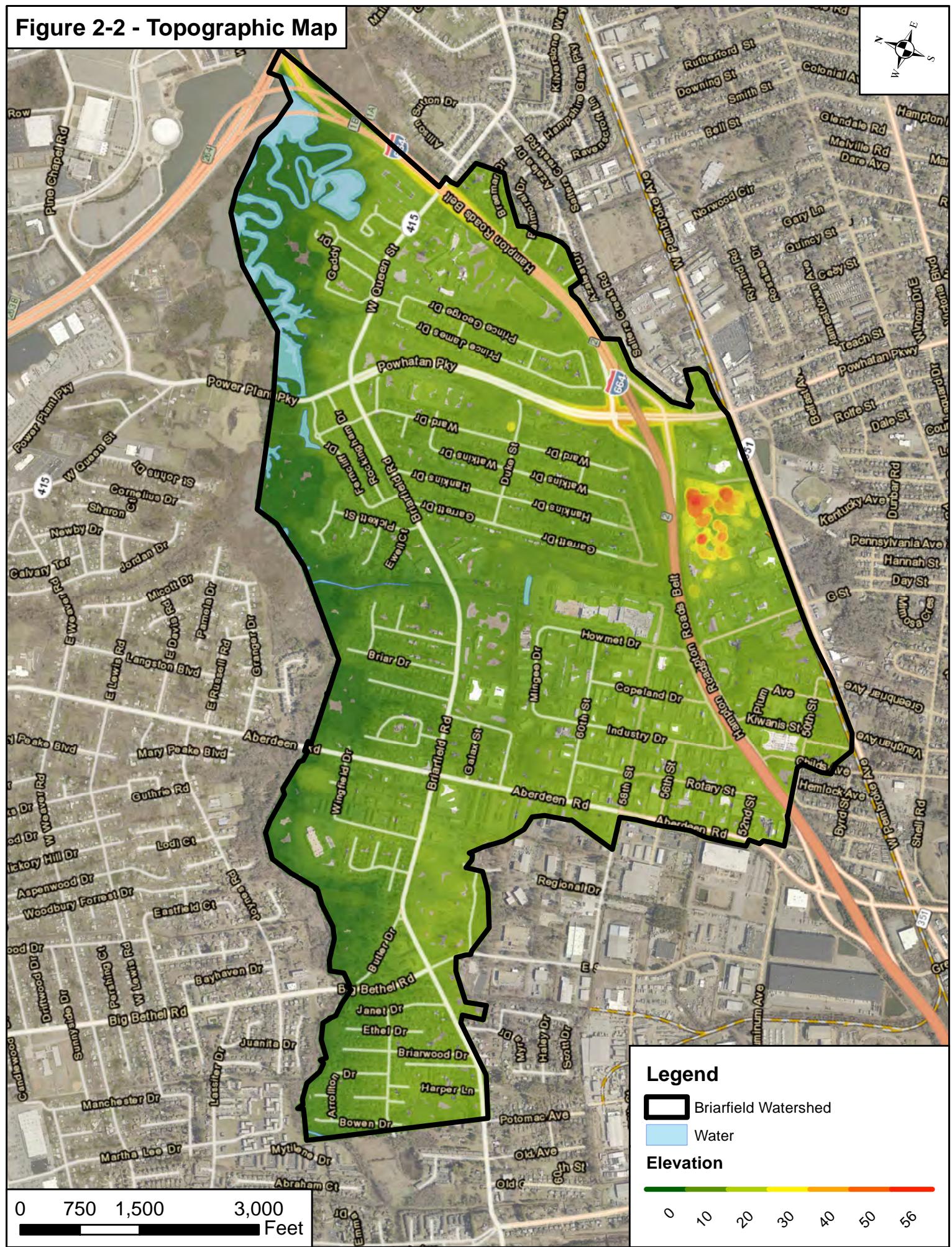


There is one large open channel system that conveys surface water to Newmarket Creek. This channel drains approximately 550 acres and flows south to north crossing under Briarfield Road at Bethel Baptist Church and empties into Newmarket Creek in the vicinity of Evans Drive. A couple of much smaller open channel tributaries flow into Newmarket Creek however, most of the drainage flows through storm pipes emptying into the Creek at various points along its path. A total of 37 stormwater outfalls convey the remaining 850 acres of watershed drainage to the Creek.

## 2.2 Topography and Soils

The watershed has a very flat topography with 0-3% slopes. It drains from a high point near I664 and Pembroke Avenue to the South and slopes to Newmarket Creek to the North. The drainage and stormwater systems generally convey stormwater from South to North (Figure 2-2).

**Figure 2-2 - Topographic Map**



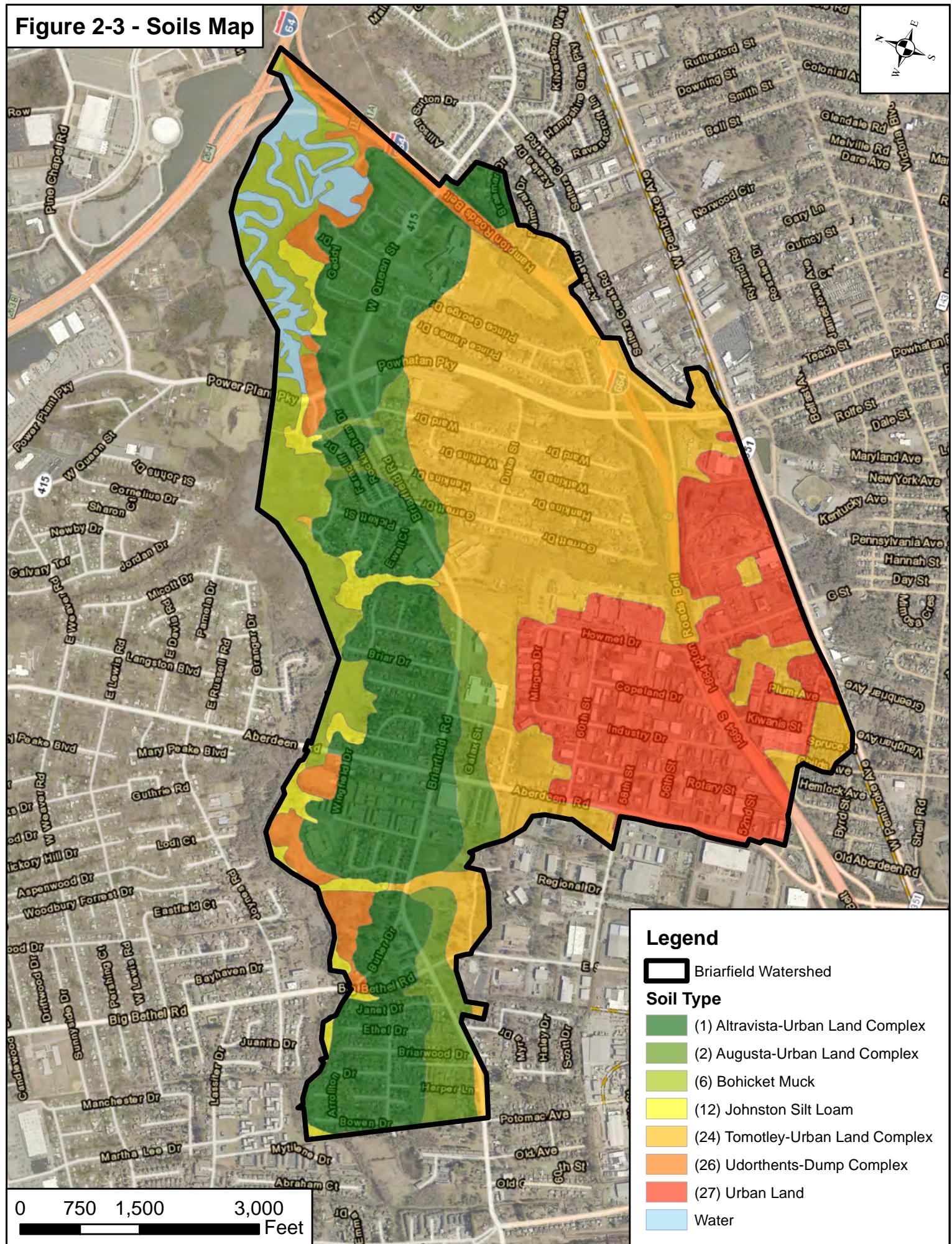
Soils found within the watershed mostly consist of hydrologic Group C or D soil with some small pockets of Groups A and B. (Table 2-1 and Figure 2-3)

- **Group A** soils have a high infiltration rate when thoroughly wet. These soils mainly consist of deep, well drained sands or gravelly sands with a high rate of water transmission.
- **Group B** soils have a moderate infiltration rate when thoroughly wet. These soils mainly consist of deep, moderately well to well drained soils with moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission.
- **Group C** soils have a slow infiltration rate when thoroughly wet. These soils have a layer that impedes infiltration or soils of moderately fine to fine texture. These soils have a slow rate of water transmission.
- **Group D** soils consist of clays have a very low infiltration rate and high runoff potential when thoroughly wet. These soils have a permanent high water table, soils with a clay layer at or near the surface, or soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Table 2-1 Watershed Soils

MUSYM	Soil Type	Description	Hydrologic Soils Group	Acreage	% of Watershed
1	Altavista-Urban Land Complex	0 to 3 percent slopes	C	330.7	26%
2	Augusta-Urban Land Complex	0 to 2 percent slopes	B/D	84.9	7%
6	Bohicket Muck	0 to 1 percent slopes, very frequently flooded	D	81.6	7%
12	Johnston Silt Loam	0 to 2 percent slopes, frequently flooded	A/D	30.2	2%
24	Tomotley-Urban Land Complex	0 to 2 percent slopes	B/D	393.9	31%
26	Udorthents-Dumps Complex	0 to 25 percent slopes	D	52.2	4%
27	Urban Land	0 to 6 percent slopes	D	247.8	20%
W	Water	Water	D	32.7	3%
<b>Total</b>				<b>1254.1</b>	

**Figure 2-3 - Soils Map**



## 2.3 Land Use

Land use is a mix of residential, commercial and public use/schools. The eastern third of the watershed includes Hampton High School and is nearly all single family residential usage along Power Plant Parkway. In the remainder, the southern watershed area (Upstream) is primarily commercial and industrial and includes the Copeland Industrial Park. The central watershed area along Briarfield Blvd is primarily schools and churches with a few commercial areas. The northern areas (Downstream) from Briarfield north to Newmarket Creek is primarily single family residential. There are a couple of larger apartment complexes along the Aberdeen Road corridor.

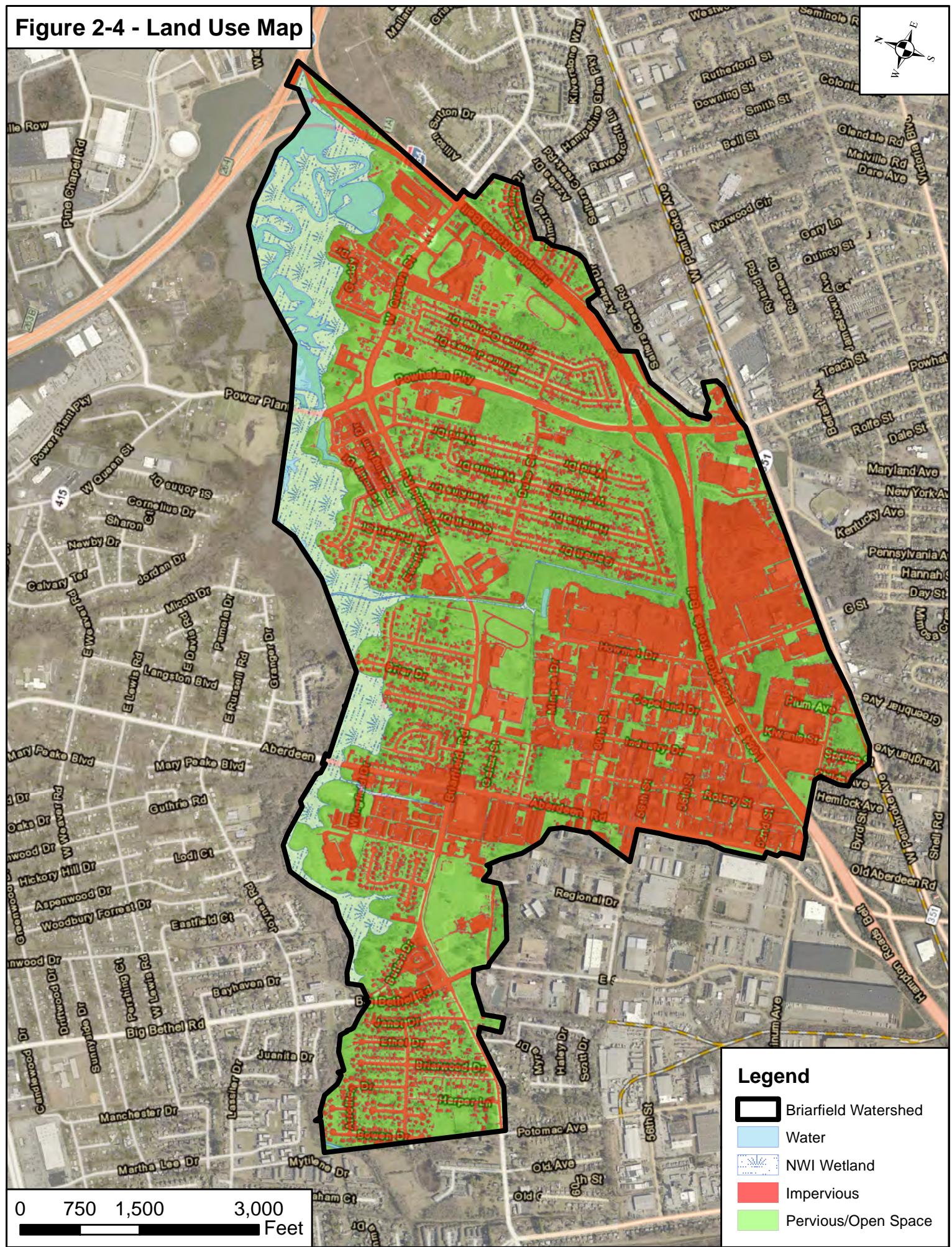
A summary of these key watershed characteristics can be found on Table 2-2. Figures 2-4 & 2-5 are maps of the watershed's generalized land use and zoning, respectively.

Table 2-2. Watershed Characteristics

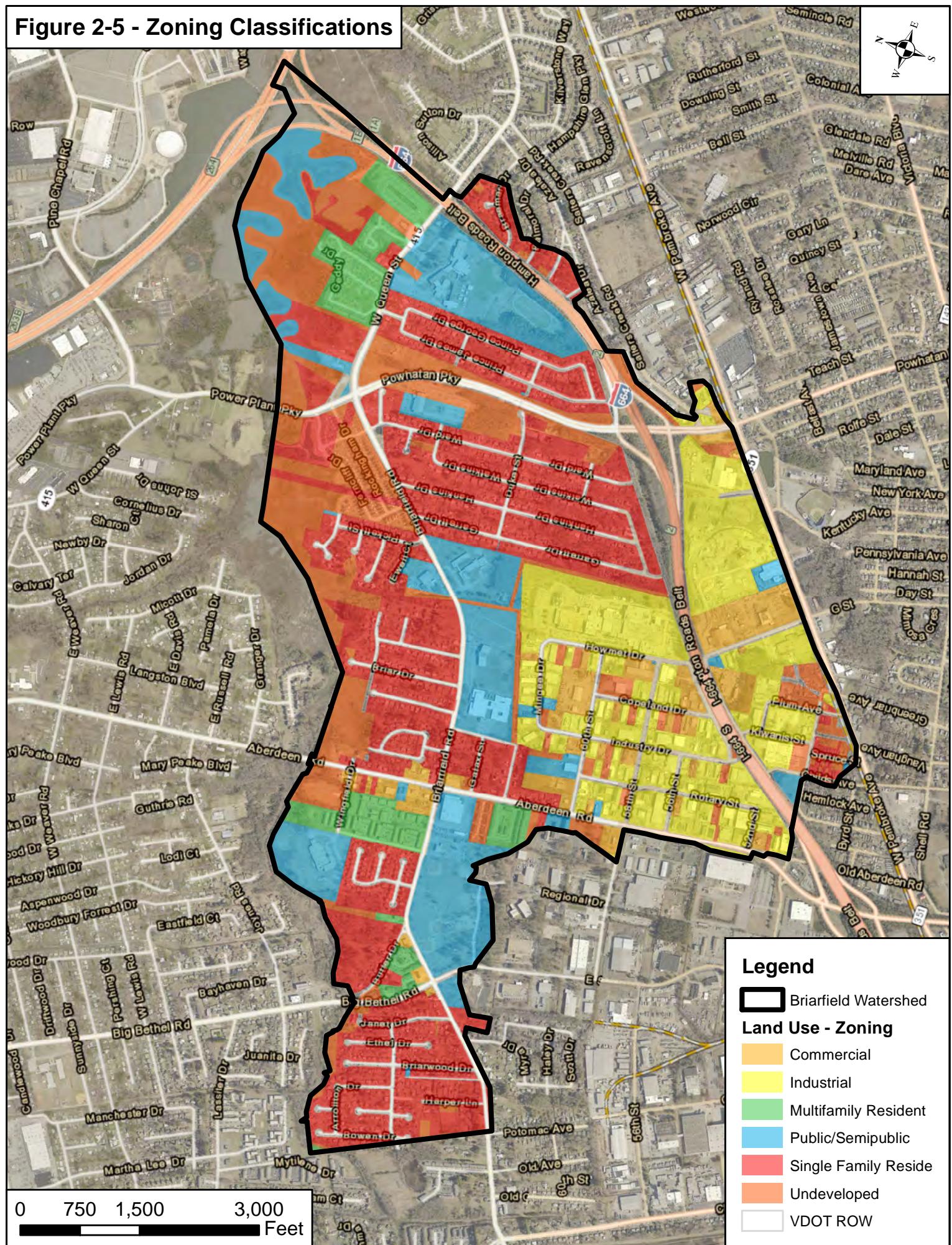
Land Use	Acreage	% of Watershed
Impervious	532.0	42%
Pervious	588.1	47%
Water	33.2	3%
Wetland	100.8	8%
<b>Total</b>	<b>1254.1</b>	

Zoning Classification	Acreage	% of Watershed
Commercial	57.8	5%
Industrial	178.8	14%
Multifamily Residential	56.6	5%
Public/Semipublic	187.9	15%
Single Family Residential	355.3	28%
Undeveloped	194.1	15%
VDOT Right of Way	223.6	18%
<b>Total</b>	<b>1254.1</b>	

## **Figure 2-4 - Land Use Map**



**Figure 2-5 - Zoning Classifications**

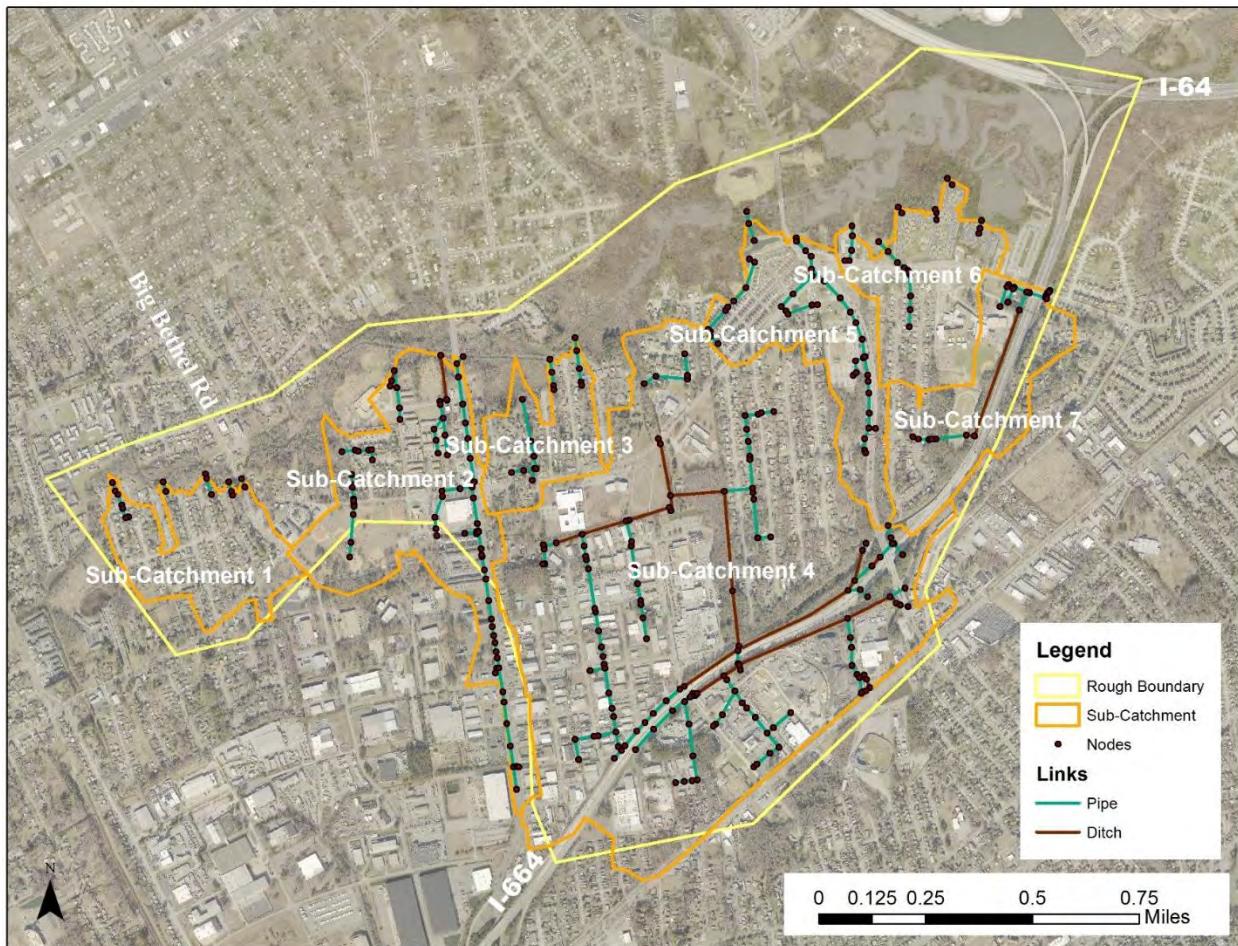


## 2.4 Drainage and Stormwater Management

The existing drainage collection system consists of ditches, culverts, and storm sewer pipes and inlets. Stormwater runoff enters the drainage system through a mixture of yard basins, curb inlets, other inlet structures, and overland flow and ultimately discharges by gravity to Newmarket Creek through 37 outfalls.

The Briarfield Watershed was divided into seven sub-catchment areas based on land surface topography and logical points such as primary roadways and outfall locations. The sub-catchment boundaries are shown in Figure 2-6. A detailed presentation at the sub-catchments and the layout of the pipe network systems can be found in Appendix-A.

Figure 2-6 Briarfield Watershed Sub-catchments



**Sub-catchment 1** on the western-most side of the watershed is a collection of five outfalls that discharge into Newmarket Creek in a residential neighborhood.

**Sub-catchment 2** includes the large pipe network system that flows south to north down Aberdeen Road,. It encompasses systems in Briarfield Park and the nearby residential neighborhoods and discharges into Newmarket Creek under the Aberdeen Bridge. This is the second largest drainage/conveyance system in the watershed and drains 136 acres. Except for a few small lateral ditches is primarily a closed pipe system. **Sub-catchment 3** is another collection of neighborhood systems with three outfalls into Newmarket Creek.

**Sub-catchment 4** is the largest sub-watershed and drains 534 acres to a central open channel system. This system begins near I-664 and G Street and flows for approximately 1 mile north and discharges into Newmarket Creek near Evans Street. There is a smaller tributary channel that flows west to east behind Lindsay Middle School and discharges into this channel near the Howmet facility pond outfall. The channel is well defined and in fairly good condition. It is very deeply cut for the lower 2/3 and tidal for approximately 1/2 of its length from Newmarket Creek to Lindsay Middle School. As a tidal ditch it has no slope and serves as a conduit for upstream tidal encroachment during Nor'easter events. The existing culverts within the channel also have extremely low to no slope.

Figure 2-7 Upstream Ditch in Sub-catchment Area 4 Downstream of I-664



Figure 2-8 Sub-catchment 4 Main Channel Downstream of Briarfield Road



**Sub-catchment 5** collects drainage from the pipe network down Power Plant Parkway and from a BMP draining the Town Park subdivision before discharging into Newmarket Creek. The Town Park subdivision BMP in sub-catchment 5 is shown in Figure 2-9 below.

Figure 2-9. Sub-catchment 5 – BMP at Town Park



**Sub-catchment 6** consists of six outfall systems that discharge into Newmarket Creek from residential neighborhoods.

**Sub-catchment 7** at the eastern-most side of the Briarfield Watershed collects runoff from a residential neighborhood and the ditches along I-664 beside Hampton High School. Sub-catchment 7 discharges into a channel under West Queen Street, which discharges into Newmarket Creek.

Most of the developments in the Briarfield Watershed are older and pre-date any stormwater management requirements. Stormwater runoff from most of this watershed is collected and conveyed into Newmarket Creek untreated.

## 2.5 Existing BMPs

As part the Bay TMDL program the City recently reviewed site plans received between 2004 and present to determine if BMPs were proposed and constructed as well as the construction dates. Data was collected for each BMP from the filed site plans and supporting documentation related to the type of BMP, drainage area, and impervious surface area. The BMPs found on the site plans were then verified through aerial photography or field visits. This information was obtained from the City and an inventory of the BMPs in the watershed used to evaluate opportunities for retrofits.

There are a few larger privately owned stormwater management facilities located within the watershed including:

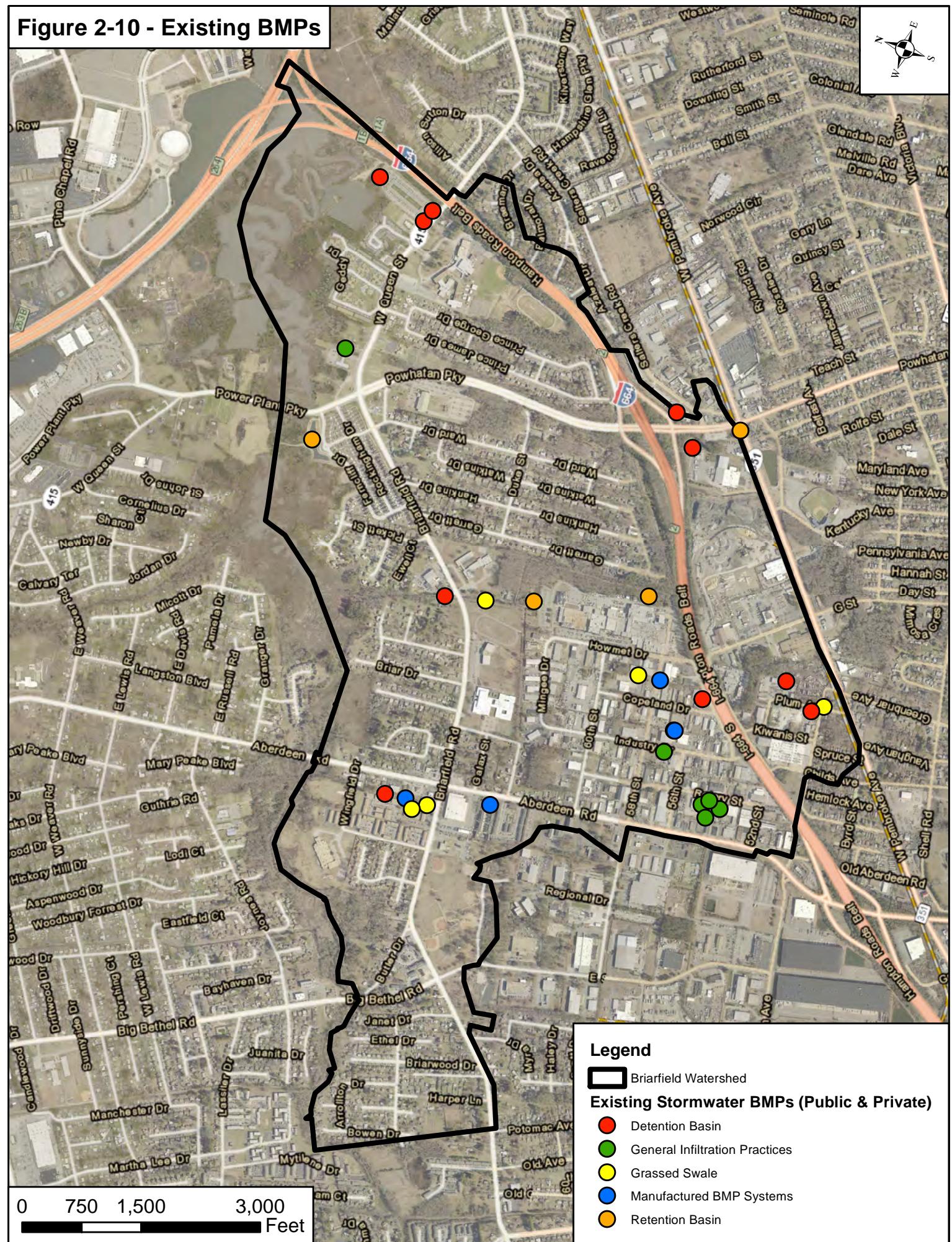
Wet pond at Town Park on Briarfield subdivision.

Wet Pond providing treatment at the Howmet facility on Howmet Drive

Extended Detention facility behind the Mt Olive day care facility on Aberdeen

All existing stormwater management facility locations can be found in Figure 2-10.

**Figure 2-10 - Existing BMPs**



## **3.0 Watershed Analyses**

### **3.1 Data Collection**

#### **3.1.1 Existing City Data and Field Inspection**

In order to conduct the watershed study information on existing conditions and characteristics of the Briarfield Watershed area was gathered and collected. Information included:

- Topographic mapping (1 foot contours)
- Utility lines and structures
- Storm sewer and drainage network including structures, pipes, culverts, ditches and swales
- Pipe sizes
- Stormwater BMPs
- Planimetric features including buildings and pavement
- Aerial photography
- Land use and Zoning
- Soils
- Watershed boundary
- Waters and Wetlands
- FEMA Map

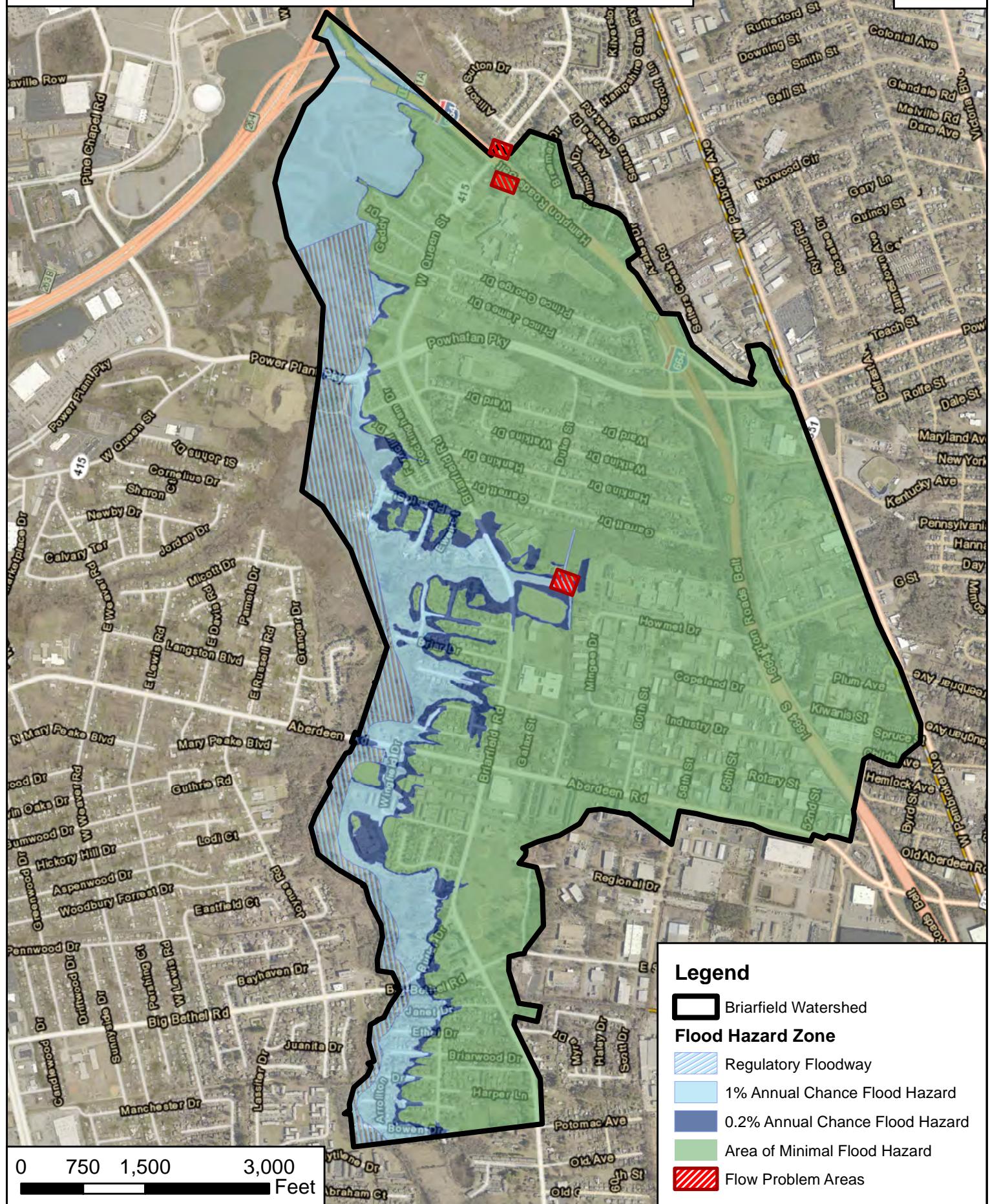
Once obtained, the data were reviewed for completeness and then an additional data needs and field verification program developed to fill in missing data or verify conflicting information. The primary purpose of the field investigation was to verify areas selected for survey and to determine if they were accessible.

#### **3.1.2 Problem Drainage Areas and FEMA Mapping**

The City provided a map of the Briarfield Watershed which highlighted existing drainage issues to aid with the development of this study. The map contains flood problem areas observed by both City employees and citizens. This map can be found in Figure 3-1.

The Federal Emergency Management Agency (FEMA) flood data for Newmarket Creek watershed provided in the Flood Insurance Rate Maps (FIRMs) and flood profiles from the August 16, 2011 City of Hampton Flood Insurance Study (FIS) for Newmarket Creek were reviewed to provide an indication of where tidal flooding might occur. These areas were useful to locate to help identify potential flood reduction projects and also areas to avoid for project construction. Flood hazard zones are shown in Figure 3-1.

**Figure 3-1 - Problem Flooding Areas and FEMA Flood Hazard Zones**  
**City of Hampton, Virginia (Independent City)**  
**Panels Used: 5155270118G & 5155270119G**



Figures 3-2 and 3-3. Showing Flooding Under I-64 Overpass on West Queen Street



Figures 3-4 and 3-5. Gage at Big Bethel Bridge Showing Minor and Major Flooding Events



Figures 3-6 and 3-7. Briarfield Park Drainage after Heavy Rainfall



Figure 3-8. Cesar Tarrant Elementary School Flooding



Figure 3-9. Church on Briarfield Flooding Along Central Watershed Drainage Ditch



Figure 3-10. Flooding Behind Homes on Westbriar Drive.

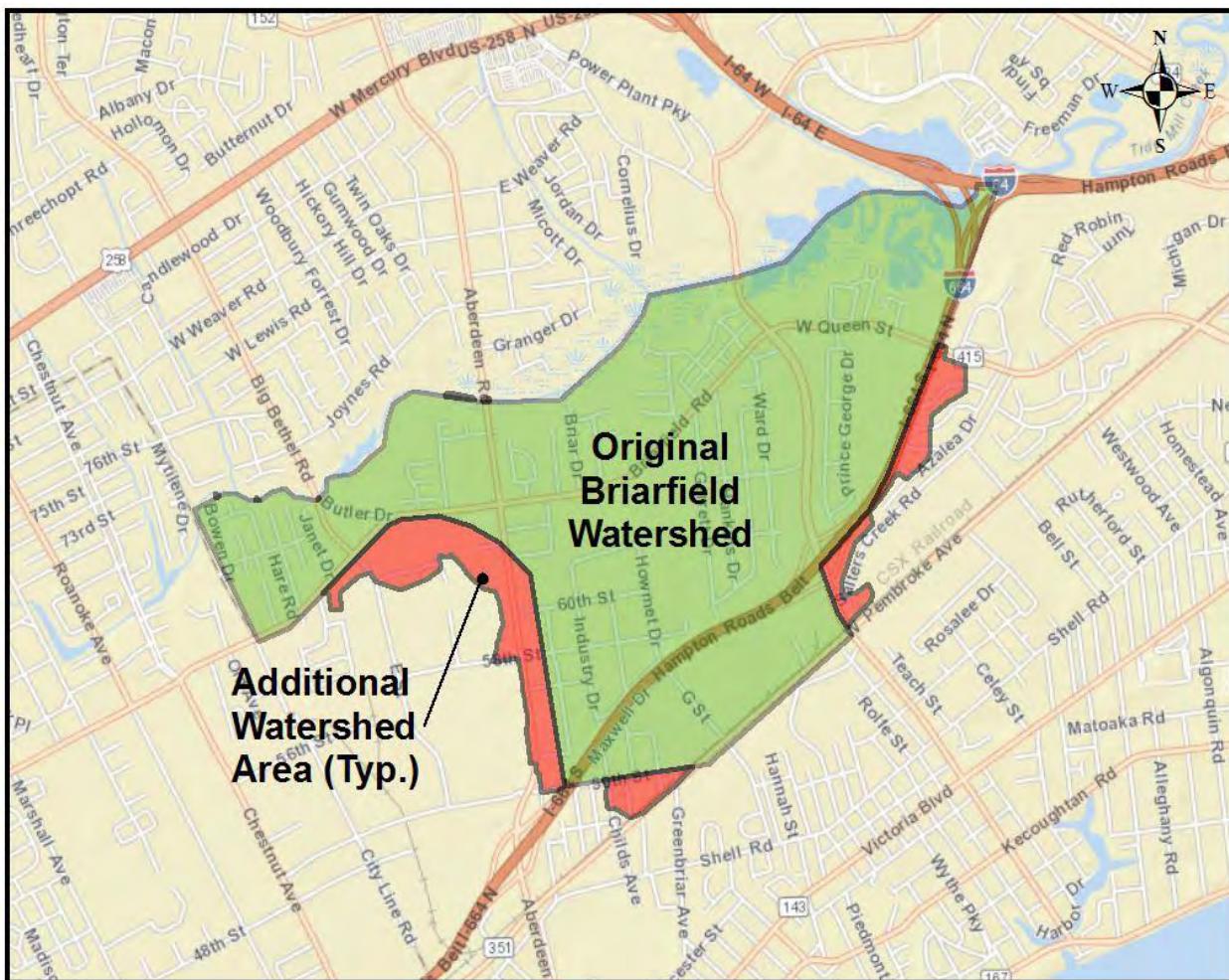


### 3.1.3. Field Investigations

After reviewing data gathered several areas were noted that needed field verification to determine storm pipe connections, confirm selected areas for survey and to inspect the drainage ditches, drainage structures, stormwater outfalls and pipe network particularly in areas with known flooding issues. Multiple field investigations were undertaken to obtain a clear understanding of the watershed's key drainage characteristics and issues. Investigations took place during dry and wet weather events including Nor'easter events to review tidal flooding and tail water conditions to verify problem areas.

During the field investigations a couple of areas outside of the identified watershed boundary in the vicinity of Briarfield Park and along I-664 were found to drain to drainage ditches in the watershed. The adjusted boundary was used in the analysis of the projects.

Figure 3-11. Briarfield Wateshed with Adjusted Boundaries.



### 3.1.4. Survey

The existing stormwater mapping and survey information in the City's GIS data base was provided for review. This mapping was complete with pipe sizes, most connections and outfall locations. However there was no elevation data which was critical to the hydrologic and hydraulic modeling. Surveying was undertaken to supplement the City GIS information to provide the necessary pipe, drainage and stormwater network characteristics needed for watershed model set-up. More than 110 locations and 17 stream cross sections were surveyed by Michaels Surveying. Most locations were surveyed but some outfalls or manholes could not be located or verified, however these were not critical for the project modeling. Also during the survey several connections and flow routings were verified and mapping corrected.

During the project data collection phase, the City of Hampton's Survey Department was in the process of updating GIS information and conducting surveys of areas west of the Hampton High school and along Aberdeen Road. This information was obtained and all cross sections, structure inverts and pipe sizes obtained were included in the project inventory, added to the GIS and used in model development. Final survey and storm sewer mapping is presented in Figure 3-12 and Appendix A

Figure 3-12. Storm Sewer and Survey Information



### 3.2 Existing Conditions SWMM Modeling

### 3.2.1 Model Description

The EPA SWMM5 model was selected as the model of choice for this project. Its code has been adopted by several software vendors into various GIS-interfaced modeling software packages. In this study, the XPSWMM (version 2012) software, with SWMM5 compatible hydrologic and hydraulic formulations, was used to efficiently develop the models, run simulations, and present simulations results on the performance of the drainage conveyance system within the Briarfield Watershed. Like all current variations on EPA SWMM, XPSWMM utilizes a dynamic link-node approach for simulations to analyze and design stormwater conveyance systems.

### 3.2.2 Model Development

The purpose of the modeling effort was to identify areas of existing ground surface flooding (due to stormwater runoff) and the likely mechanisms of this flooding in order to evaluate the effects of proposed water quality improvements or flood mitigation project alternatives. As noted above, the existing conditions Briarfield Watershed model was developed using data provided by the City of Hampton, information gathered from multiple site visits by the project team, and targeted field surveys.

Some of the information obtained through GIS and City documents may be outdated. However, for the purpose of this study, the City data supplemented by the limited field investigations provides a sufficient

basis from which to build and apply the SWMM models for evaluating causes of and potential mitigation for stormwater flooding in the watershed.

Drainage area characteristics were estimated from GIS and field investigations. These characteristics included; area, slope, width, and percent impervious. The Green-Ampt method for infiltration was chosen to maintain consistency with prior watershed studies completed for the City. Green-Ampt method parameter values for average capillary suction, initial moisture deficit, and saturated hydraulic conductivity were determined from the soil properties discussed above.

Pipe locations, inverts, and cross sections were found using GIS data provided by the City, site plan documents provided by the City, information gathered from multiple site visits by WR&A, and survey data. In the present study, pipes of diameter 24 inches or larger and ditches of equivalent dimension were included directly in the model. Runoff from areas within each sub-catchment associated with smaller pipes, which were excluded from the model setups, was loaded to the nearest adjacent, connected node on a 24-inch or larger pipe or ditch.

Open channels, ditches, pipes, and culverts were represented as links within the model. Link characteristics included a Manning's "n", upstream and downstream inverts, diameter (or base-width, depth, and side slopes), and length. Where applicable characteristics of each link were obtained from GIS, the GIS data was supplemented with data from the surveys and site visits. Where invert elevations were unavailable either from the GIS data or survey data, the inverts were linearly interpolated from the nearest adjacent, hydraulically connected inverts.

### 3.2.3 Storm Conditions Simulated

The 2-, 5-, 10-, and 50-year return period design storm rainfall depths were obtained from NOAA Atlas 14 Point Precipitation Frequency Estimates for the City of Hampton as provided in Appendix A - Storm Sewer Map with Surveyed Structures and Baseline Model Data. The SCS Type II, 24-hour cumulative rainfall distribution was applied using a constant rainfall time interval of 0.1 hours (6 minutes).

Stormwater-induced ground surface flooding in low-lying coastal watersheds (such as Briarfield) is highly influenced by water surface elevations in adjacent tidal waterways. In the present case, Newmarket Creek is the tidal waterway that connects Briarfield Watershed hydraulically to tides and storm surges in the Chesapeake Bay. The effects of these tidal and storm surge tailwater elevations were evaluated by running the four different rainfall scenarios in combination with three different tailwater conditions applied at the stormwater system outfalls on Newmarket Creek. Simulated tailwater scenarios included the typical monthly Mean High Water (MHW) elevation, the 10-year return period, and the 50-year return period tailwater elevations in Newmarket Creek. The typical MHW elevation was obtained from published values for NOAA station number 8638610 at Sewell's Point as provided in Appendix-A Existing Data. The 10-year and 50-year return period elevations were taken from the July 31, 2014 preliminary FEMA FIS conducted for the City of Hampton as shown in Appendix A-Existing Data.

Combining the three tailwater elevations with the four design rainfall events yielded a total of 12 existing conditions model simulations. Maps showing the locations of ground surface flooding resulting from each of 12 simulations are provided in Appendix B-Existing Conditions Results.

The Appendix A map results can be read as follows: Each map shows a subset of the total watershed area, and a text note at the top of each map identifies the tailwater condition associated with each map's results. Pipes are shown as green lines, and ditches are shown as brown lines. Model nodes (manholes, inlets, outfalls, etc.) are shown as black circles, and nodes that flooded during at least one simulation are

further identified by color triangles. The color-coding of the flooded node markers is organized so that nodes that flood only in the 50-year return period rainfall simulation are green triangles. Nodes that flood in the 10-year return period rain are yellow, and those that flood in the 5-year return period rain are orange. Finally, nodes that flood in the 2-year return period rainfall are shown as red triangles. This progression from green to red markers helps the reader to see which nodes flood in relatively high-probability (low return-period) events compared to those which would not be expected to flood until a low-probability (high return-period) event occurs.

Shaded polygons on certain areas of the watershed drainage system maps illustrate the likely mechanism for node flooding in those areas. Different color polygons are given for flooding caused by negative pipe slopes or undersized pipes vs. flooding due to low node rim elevations vs. areas that flood because the tailwater elevation is greater than the ground surface adjacent to Newtown Creek. Different types of solutions would be applicable to address the different types of flooding mechanisms.

### 3.2.4 Existing Conditions Stormwater Simulations and Flooding Analysis

Results of flooding were analyzed to determine most likely mechanisms of surface flooding in the various parts of the watershed: i.e. whether flooding was likely due to undersized pipe areas of low surface elevation, negative pipe slope, or influences from high tailwater conditions. Undersized pipe conditions were determined by analyzing sharp changes in the hydraulic grade line slope. Negative slopes were identified directly from the pipe invert profiles, which were based largely on City GIS data. Additional verification of these conditions may be desired before proceeding with specific design alternatives in these areas.

Flooding in sub-catchment 1 is mainly influenced by high tailwater elevations at the 10-year and 50-year return periods (for tailwater). The sharp changes in the hydraulic grade line slope of several of the systems in this sub-catchment suggests they are undersized, as shown in Janet Drive system in Appendix B-Figure 1.

Flooding in sub-catchment 2 is influenced by undersized pipes at the downstream ends of many of the stormwater systems. The main collection-conveyance storm pipe system down Aberdeen Road, has a 66 inch diameter pipe leading into a 53 inch elliptical pipe near the downstream end of the system, which causes a jump in the hydraulic grade line slope as shown in Appendix B-Part 2-Segment 2. There are several areas in the sub-catchment where low surface elevation is also influencing the occurrence of flooding.

Flooding in sub-catchment 3 is mainly influenced by high tailwater elevations from the 10-year and 50-year return periods (for tailwater). There is also a case of a negative pipe slope in the system off Thornbriar Court, as shown in Appendix B-Part 2-Segment 3.

Flooding in sub-catchment 4 is attributed to undersized pipes, apparent negative slopes, and low ground surface (structure rim) elevations. One residential system off of Duke Street has several negative pipe slopes and sharp changes in topography, as shown in Appendix B-Part 2-Segment 4. The system west of Howmet Drive near the upstream end has a 19 inch elliptical pipe between a 30 inch pipe downstream and a 24 inch pipe upstream, and a sharp increase in the hydraulic grade line can be observed in this area, as shown Appendix B-Part 2-Segment 5.

Flooding in sub-catchment 5 can be attributed to high tailwater elevations at the outfall location from the 10-year and 50-year return periods (for tailwater). The systems in these sub-catchments are mainly

experiencing flooding at the 50-year return period rainfall level. Although these pipes may be considered undersized for the 50-year return period rainfall, they seem to be capable of handling the other lower storm return periods. Appendix-B-Part 2-Segment 6 shows the minimal flooding apparent from the 50-year return period rainfall in the Town Park Drive system. Low surface elevation and negative pipe slope play a role in some of the flooding evident on the Power Plant Parkway.

Flooding in the sub-catchment 6 system down Buckingham Drive and under West Queen Street experiences early flooding from the influence of undersized pipes, negative pipe slopes, and low surface elevations, as shown in Appendix B-Part 2-Segment 7. The four outfalls in the Crystal Lake subdivision and neighboring subdivision off W Queen St appear to be adequately sized with no flooding indicated by the models.

The flooding in sub-catchment 7 has been verified by the City as a flow problem area. This system handles a significant amount of runoff flow, as it is fed by ditches on either side of I-664 going into 48 inch and 60 inch pipe diameters. The outfall for this system by Hampton High School consists of three 30 inch pipes. That system appears to be able to handle the flow it receives. It is the smaller, 15 inch diameter, disconnected system in this area on W. Queen Street that appears to be sized to handle the 2-year return period rainfall, as it experiences flooding at higher rainfall events. This area was the subject of several field verification visits, to ensure correct modeling.

### 3.2.5 Comparison with Historical Flooding Areas

The reasonableness of the existing conditions model results was confirmed by verifying the occurrence of flooding in the model with respect to identified flooding areas provided by the City. The model results were compared to the City's mapped high water levels and the City's information on historical flooding throughout the watershed. Model hydrologic and hydraulic parameters were then adjusted to match the known information on flooded areas and depths to the extent practical with the available information.

Sub-catchment 7 contains two areas that were identified by the City as being a conveyance capacity / choke-point area. Flooding is observed in the modeled results for these areas for the existing conditions model in the 5-year return period rainfall with MHW tailwater. Sub-Catchment 4 also contains a City identified flooding area where the two open channels join near Lindsay Middle School. Flooding is observed in this location to varying degrees in each of the 12 existing conditions simulations.

## **4.0 Watershed Management Strategies**

### **4.1 Introduction**

The City of Hampton has developed a variety of potential strategies to meet its Chesapeake Bay TMDL Action Plan that were presented in the WIP II. These strategies also help with implementing other programs such as the Back River TMDL and MS4 requirements. As a heavily-developed urban Phase I MS4 municipality strategies were developed to provide the greatest benefit for an urban community. These strategies included five broad areas of which three of them are facilitated by this plan:

- Watershed Restoration and Preservation Activities
- Retrofits to Existing Systems and Structures
- Construction of New Structural BMP Measures

This plan focuses on identifying and quantifying projects to help implement these strategies and the results will provide information for the City to help prioritize implementation actions based on measurable improvement, public support, and available funding. Other management strategies and policies including those supporting the 6 minimum measures of the MS4 permit and other programs were assumed to be implemented under other action plans and not included in this plan.

#### ***Watershed Restoration and Preservation***

The City has an ongoing program to perform ecological restoration projects and to identify, prioritize and preserve sensitive ecological resources throughout the City. The enhancement of the natural environment to treat stormwater runoff and the preservation of highly functioning areas are cost effective ways of improving water quality and enhancing recreational and educational opportunities for city residents. One of its primary strategies is:

1. Develop a plan to prioritize wetland restoration sites and identify restoration sites in each City watershed. Evaluate the opportunities for restoration on those sites and rank the identified sites. Prepare preliminary designs for the restoration of the sites that can be used to secure grant funding or prepare estimates for future Capital Improvement Project funding requests.

#### ***Retrofits to Existing Systems and Structures***

Physical capital improvements throughout the City could be used to provide quantifiable pollutant removal. Retrofit and enhancement of existing infrastructure to improve its performance is viewed as a more cost effective approach to stormwater quality improvement than new BMP construction. Retrofit and enhancement opportunities will be evaluated and could include many different activities. One of its primary strategies is:

Consider installing retrofits on all City-owned stormwater ponds to improve efficiency.

#### ***Construction of New Structural BMP Measures***

Physical capital improvements throughout the City could be used to provide quantifiable pollutant removal. These improvements could take the form of the construction of new BMPs where BMPs do not currently exist, incorporating higher levels of stormwater treatment on future city projects beyond that required by current and future stormwater regulations and increasing the amount of environmental restoration activities undertaken on city properties. Stand-alone BMP construction projects are generally the most expensive options for water quality enhancement. Considerable design and off-site improvements are generally required to construct a practice within an existing storm drainage system. Two of its primary strategies are:

1. Develop, implement, and fund a BMP Plan to meet the Phase II Watershed Implementation Plan consistent with Chesapeake Bay TMDL 2 year milestone requirements.
2. Explore the possibilities for the construction of stand-alone BMPs to treat currently untreated stormwater runoff prior to its discharge into surrounding waterways. Evaluate the opportunities for BMP construction as detailed in watershed master plans and seek funding in future Capital Improvement Plans for the construction of new BMPs.

#### 4.2 Stormwater Facility Site Selection

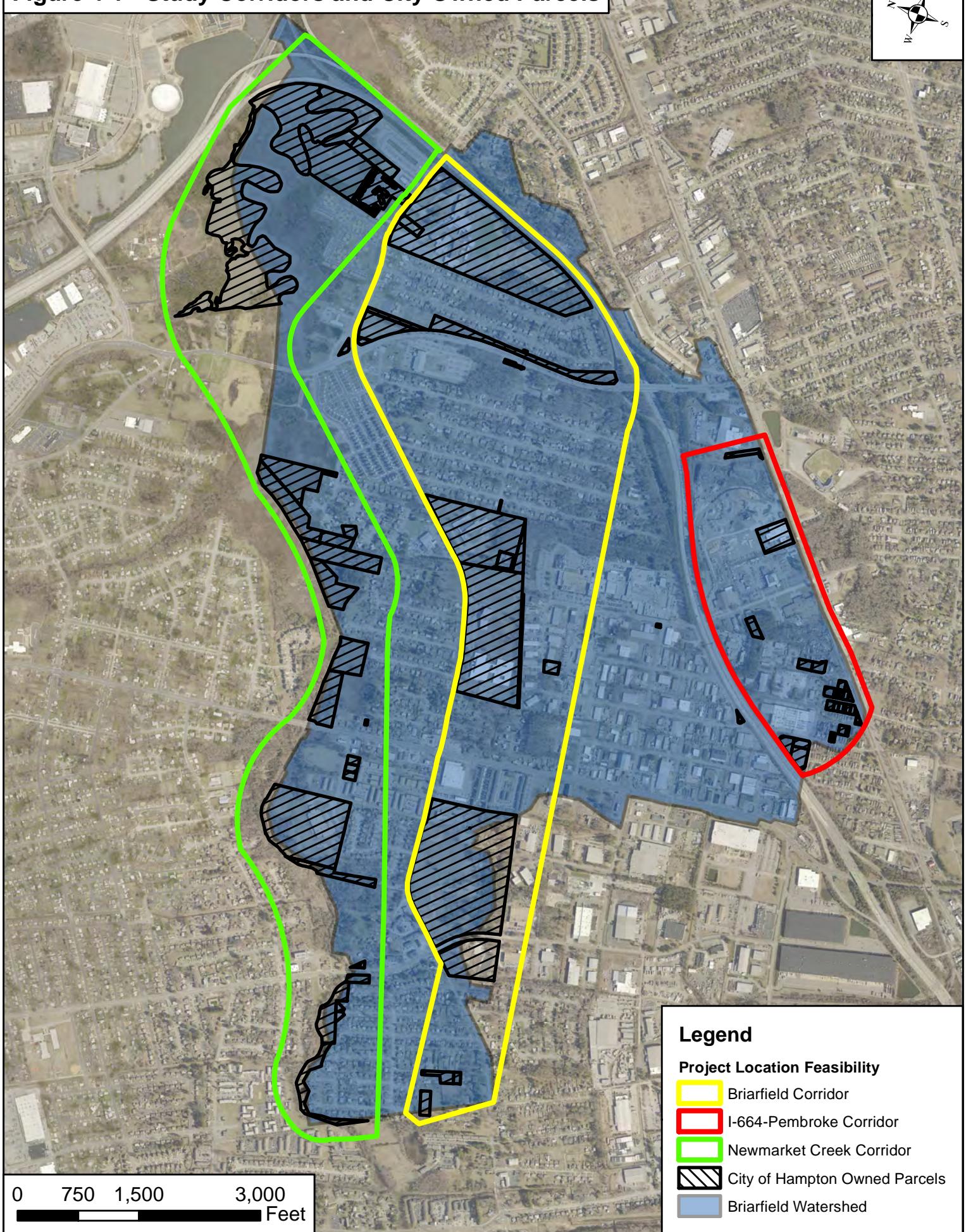
There is a wide array of stormwater management facilities that are capable of providing nutrient and sediment reduction to meet the Chesapeake Bay TMDL and other program goals as well as downstream flooding reduction. Site constraints such as ownership, existing stormwater infrastructure, utility and roadway constraints, contributing drainage area, land use, available area, hydraulic head, water table, soil type, and public safety should be taken into account when selecting a stormwater management facility design at a site.

The study area is nearly completely built out and any open spaces remaining are in the floodplain along Newmarket Creek. Purchasing private lands is very expensive and typically adds significant costs to BMP construction, especially if building demolition is involved. Therefore BMP site selection was limited to public parcels which fortunately were numerous along the Briarfield Road corridor. There were also several City owned parcels along the Newmarket Creek corridor however they were typically in flood prone areas, wetlands, or had other constraints. There were several City owned parcels between I-664 and Pembroke Avenue that were also considered including Park Place Playground and a few other undeveloped parcels in the area. However, most of them were at the upper end of the watershed and did not offer water quality benefits beyond the undeveloped area that they occupied.

Generally, the area along the Briarfield Road corridor was favorable to BMP siting since it offered publicly owned sites with limited roadway and utility interferences that were near the upstream and mid-stream sections of the watershed where reasonably sized BMPs could be located. Additionally, these areas typically did not have other environmental features such as natural streams, floodplains and wetland would hinder project development. Many of the sites however were adjacent to schools or parks that presented some safety concerns that would need to be considered in project development.

Site identification focused on selecting areas that would provide projects with maximum benefits with reduced site complications and lower costs (Figure 4-1).

**Figure 4-1 - Study Corridors and City Owned Parcels**



#### 4.3 Stormwater Management Practice Selection

There is a wide array of stormwater management facilities that are capable of providing nutrient and sediment reduction to meet the Chesapeake Bay TMDL and other program goals as well as downstream flooding reduction. The Virginia Stormwater BMP Clearinghouse has approved several facilities as described below. Brief summaries and overviews of the facility types with, including the approved water quality efficiency rates are provided below.

Generally, these facilities can be grouped into 2 general categories based on configuration, particularly for a coastal community. These are larger capture-treatment-infiltration facilities such as ponds and wetlands and smaller linear facilities such as swales and streams. Ponds and wetland stormwater management facilities provide flood reduction in addition to water quality benefits. The site and area constraints typically determine the general category of facility and the site specific characteristics determine the selected practice.

##### Ponds and Wetlands

**Wet ponds** are Stormwater Management Facilities that detain runoff and maintain a permanent pool of water. The permanent pool promotes particulate settling, biological activity and uptake, and reduces effluent nutrient loads by diluting runoff. Additional storage can be designed in the system by allowing water storage above the permanent detention pool to accommodate larger storm events. Wet ponds can treat a large volume of contributing drainage area making them attractive for large developments. Safety issues are a concern when using them around schools and public areas.

**Extended detention ponds** rely on 12 to 24 hour detention of stormwater runoff to achieve their designed benefits. The outlet structure is designed to restrict the stormwater outflow that is stored within the basin. The temporary ponding enables particulate pollutants to settle out and reduces the maximum peak discharge to the downstream channel. ED ponds rely on settling as their primary pollutant removal mechanism. Consequently, they generally provide fair-to-good removal for particulate pollutants, but low or negligible removal for soluble pollutants, such as nitrate and soluble phosphorus.

The major design goal for ED Ponds in Virginia is to maximize nutrient removal and runoff reduction.

**Constructed wetlands** are engineered stormwater management facilities that treat runoff through natural processes to adsorb, filter, and detain stormwater. They feature an array of surface micro-topography to promote aquatic plant life to facilitate pollutant removal processes. Constructed wetlands can temporarily pond stormwater up to 12 inches, providing some limited storage for channel protection and flood mitigation. The contributing drainage areas are typically very large and the high groundwater table of the coastal plain is a benefit for maintaining them during dry periods.

**Bio-retention** areas are an efficient stormwater management facility for nutrient removal in smaller catchment areas with the maximum desired contributing drainage of 5 acres. Runoff is captured in shallow basins which temporarily pond stormwater less than 12 inches before filtering it through a soil media. Bio-retention areas reduce runoff inch of rainfall through infiltration and evapotranspiration. Additionally, extra storage can be designed in the engineered soil matrix and stone/underdrain layer to accommodate larger storm events. Since bio-retention areas are often landscaped with attractive plants, they are generally accepted by the community and can act as a landscaping amenity. They typically require under drain systems in the coastal plain due to poor soils.

## Linear Systems

**Grass channels** can provide a modest amount of runoff filtering and volume attenuation with in the stormwater conveyance system resulting in the delivery of less runoff and pollutants than a traditional system of curb and gutter, storm drain inlets and pipes. The performance of grass channels will vary depending on the underlying soil permeability (Table 1). Grass channels, however, are not capable of providing the same stormwater functions as dry swales as they lack the storage volume associated with the engineered soil media (see Specification No. 10). Their runoff reduction performance can be boosted when compost amendments are added to the bottom of the swale (See Stormwater Design Specification No. 4). Grass channels are a preferable alternative to both curb and gutter and storm drains as a stormwater conveyance system, where development density, topography and soils permit. Grass channels can also be used to treat runoff from the managed turf areas of turf-intensive land uses, such as sports fields and golf courses, and drainage areas with combined impervious and turf cover (e.g., roads and yards).

**Dry swales** are similar to bio-retention cells that are shallower, configured as linear channels, and covered with turf or other surface material and typically an underdrain to filter stormwater runoff. The primary pollutant removal mechanisms operating in swales are settling, filtering infiltration and plant uptake. Runoff is directed into the swale which temporarily ponds stormwater before rapidly filtering through the soil media. Extra storage can be designed in the soil matrix and stone/underdrain layer to accommodate larger storm events. Dry swales are typically well-suited for roadway and residential areas and can be planted with turf grass, tall meadow grasses, decorative herbaceous cover, or trees. They require more frequent maintenance than bio-retention areas and are best suited to areas with more frequent maintenance.

**Wet swales** can provide runoff filtering and treatment within the conveyance system and are a cross between a wetland and a swale. They are a linear conveyance system with wetland plants that filter and treat stormwater runoff. On-line cells are formed within the channel to create saturated soil or shallow standing water conditions typically less than 6 inches deep. While Wet Swales do not provide runoff volume reduction, they do provide moderate pollutant removal, depending on their design. Wet swales are not as effective at pollutant reduction as constructed wetlands however, they are particularly well suited for the flat terrain and high water table of the coastal plain.

**Infiltration practices** provide a means for stormwater runoff to infiltrate into underlying soils. Runoff passes through pretreatment mechanisms which trap sediment and organic matter before it reaches the practice. Infiltration practices have the greatest runoff reduction capability of any stormwater practice and are suitable for use in residential and urban areas. Infiltration practices reduce up to 90% of runoff from the first 1.0 inch of rainfall through infiltration. Additionally, extra storage can be designed on the surface or in subsurface storage volume to accommodate larger storm events. These practices have limited applicability in the lower coastal plain areas due to poor soils.

**Urban stream restoration** is not listed as a stormwater management option in the Virginia Stormwater BMP Clearinghouse; however, it is recognized as a watershed strategy effective at reducing nutrient and sediment loads to the Chesapeake Bay. An expert technical panel developed the “Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects” dated January 17, 2014. Although stream restoration is typically a very cost-effective pollutant reduction strategy, Newmarket Creek and its smaller tributaries the watershed are tidal and would not qualify for this practice.

**Shoreline management** can be implemented in areas where there is a demonstrated need to control erosion to the Bay and where there will be a water quality benefit from the practice. The following benchmarks are commonly used to determine if the shoreline management practice should be considered: 1) site energy; 2) water depth offshore; 3) fetch; and 4) erosion rate. Practices should be implemented that are appropriate for the site and are the minimum necessary to address the identified erosion problem. For example, the

practice footprint should be minimized to reduce the amount of clearing and grading and impacts to other natural resources. In the recently approved “Recommendations of the Expert Panel to Define Removal Rates for Shoreline Management Projects” Protocol 3 –Sedimentation, credit is assigned based on the sediment trapping capabilities of both vegetative planting and/or on sediment deposition behind shoreline management structures. The pollutant load reduction is based on the square footage of wetland planting. This credit applies to sediment and phosphorus and is calculated by multiplying the acres of marsh planting by 6,959 lbs total suspended solids/acre/yr) and for total phosphorus load removed, multiply the acres of marsh planting by 5.289 lbs total phosphorus/acre/yr).

**Stormwater facility conversions and retrofits** are a diverse group of projects that provide nutrient and sediment reduction on existing development that are inadequately treated by an existing BMP or are currently untreated by any BMP. Nutrient and sediment removal rates for each retrofit project are determined based on characteristics of the contributing drainage area, the BMP type, the BMP volume or size, proposed improvements or features added to the BMP. The difference between the post and pre condition pollutant removal rates is the pollutant removal rate credited. Although most of the developed areas in the watershed are untreated by BMPs due to the age of construction, there are currently no BMPs that could be retrofit or upgraded.

Table 4-1 shows the Virginia Clearinghouse removal rates for stormwater projects that were utilized for planning purposes in this study.

Table 4-1. Stormwater Management Facility Types

Stormwater Management Facility Type	Virginia Clearinghouse Efficiencies		
	N Removal	P Removal	TSS Removal
	Efficiency (%)	Efficiency (%)	Efficiency (%)
Grass Channel	28	23	Retrofit Curve
Dry Swale 1	55	52	Retrofit Curve
Dry Swale 2	74	76	Retrofit Curve
Wet Swale 1	25	20	Retrofit Curve
Wet Swale 2	35	40	Retrofit Curve
Stream Restoration	.20 lbs/yr/lf	.068 lbs/yr/lf	310 lbs/yr/lf
Shoreline Management		5.289 lbs/yr/acre	6,959 lbs/yr/acre
Wet Pond 1	20	45	Retrofit Curve
Wet Pond 2	30	65	Retrofit Curve
Extended Detention 1	10	15	Retrofit Curve
Extended Detention 2	24	31	Retrofit Curve
Wetland 1	25	550	Retrofit Curve
Wetland 2	55	75	Retrofit Curve
Bio-filtration 1	64	55	Retrofit Curve
Bio-filtration 2	90	90	Retrofit Curve
BMP Conversions	BMP specific	BMP specific	BMP specific

When evaluating the practice to implement on a particular site depending on constraints, those measures with the highest efficiencies, lowest maintenance costs and known reliability over the long-term were selected. Also, most of the measures have quantifiable flood reduction benefits that could provide added benefits of reducing downstream flooding depending on site specific hydrologic conditions. The downstream sections of the watersheds are mostly tidal and therefore flood reduction benefits of any of the proposed stormwater features may not be significant, however it was a consideration.

Even if sufficient area is available, because of watershed characteristics and drainage area it may not be possible to treat enough stormwater to make a BMP construction feasible. Wet ponds and wetlands are expensive to construct, and need to treat runoff from a large area to make them cost effective. Other BMPs such as infiltration practices are limited to treating a few acres at most. Previous experience and judgement was used in identifying the potential selected practice for evaluation.

#### 4.4 Evaluation Procedures

This section presents an overview of the evaluation procedures for the restoration strategies and associated pollutant load reductions for BMPs proposed for the Briarfield Watershed.

##### 4.4.1 Pollutant Reduction Calculation Methodology

A combination of the Virginia RRM spreadsheets and Chesapeake Bay Program Retrofit Curves/Equations were used to determine potential N, P and TSS pollutant loading and removals for the selected stormwater improvement projects. The VA RRM methodology was chosen because of its acceptance by VDEQ and its use by VDEQ in the SLAF grant assistance program for evaluating project funding.

Pollutant loadings were calculated using Table 2a values from the Chesapeake Bay TMDL Guidance document. The known acreages for pervious, impervious and forested lands within the sites drainage area were input into the VRRM spreadsheets to obtain the N and P pollutant removals in pounds per year. Soils data was obtained and hydrologic soil groups were delineated utilizing data from the United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS). Land use data was obtained by the City Land cover data for the City of Hampton and included impervious area, managed turf, forest, wetland, and open water. The VRRM spreadsheet assigns runoff coefficients to each hydrologic soil group and land cover type. Using these data, as well as the drainage areas and annual rainfall, the yearly pollutant loads were determined for each potential project.

Chesapeake Bay Program retrofit equations provided in Appendix V.B of the Chesapeake Bay TMDL Guidance document were used to calculate the TSS removal efficiencies on a site by site basis, as they are not provided in VRRM spreadsheets. A runoff treatment depth, 1 inch for all Level I practices, was plugged into the specific TSS equations provided in Table V.B.2 of the appendix based on whether the practice was a runoff reduction practice or a stormwater treatment practice. The resulting TSS removal efficiency was applied to the calculated TSS pollutant loading, producing the TSS loading removal for each proposed facility.

Existing water quality loading was determined with the use of soils data, land use data, and land cover data input into the Virginia Stormwater Management Program Runoff Reduction Method (VSMP RRM) spreadsheet.

##### 4.4.2 Soil Conditions

One of the key factors affecting facility design are soil characteristics. Many of the approved BMPs assume that certain soil characteristics are present in order to properly pond or infiltrate water depending on the practice. Although generalized soil information is available from the soil survey, preliminary site specific investigations were conducted for most of the sites to support the preferred facility design features. At each of the project locations, hand auger borings were advanced to groundwater to note its depth, soil type and descriptive information to confirm soil survey description.

#### **4.4.3 Flood Plains**

For each site identified, its location in the floodplain and floodway was evaluated to determine if there would be any issues of project construction in these areas. For the comparison, the FEMA Flood Insurance Rate Map (FIRM) system, was utilized to obtain GIS shapefiles of the flood hazard zones and the regulatory floodway. Those shapefiles were overlaid onto our proposed locations in GIS to identify the proposed project location in reference to the floodplain and floodway and the flood hazard zones if any that occurred on the sites.

#### **4.4.4 Wetlands**

The U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) online mapping system was utilized to search for wetlands that might be impacted by project construction. Potential wetlands within the vicinity of each of the proposed projects were viewed to determine if there might be any impacts, the degree of impacts (acreage) and the type of wetlands that might be impacted.

#### **4.4.5 Cultural and Historical Resources**

Cultural and historical resource screening was conducted through the Virginia Cultural Resource Information System (VCRIS). The proposed projects sites within the watershed were examined on the VCRIS maps and a data base search conducted to determine if there were any historical or cultural sites within any of the proposed project locations.

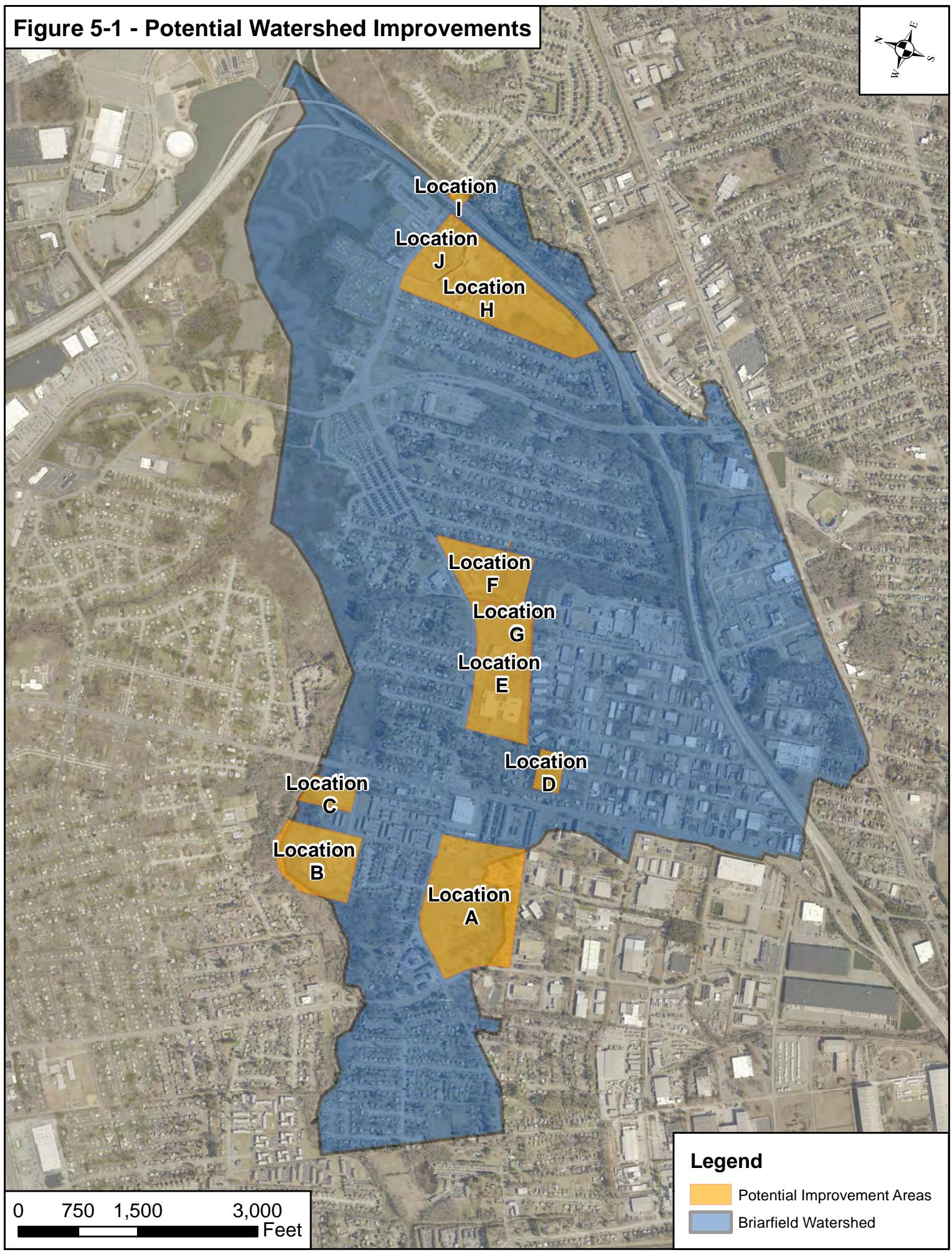
#### **4.4.6 Threatened and Endangered Species**

An Environmental Desktop Search has identified the Bald Eagle and the northern Long-eared Bat as potential endangered species in the watershed. None of the project sites are located within one mile of a known Bald Eagle nest and therefore there would be no issues with any tree removal or time of year restrictions on construction. The watershed is within the Long-eared Bat white-nose syndrome (WNS) area. Therefore if a hibernacula or maternity roost trees are identified new regulations published in January of 2016 have established guidelines for the incidental taking of the bat as a result of tree removal. The removal of any trees within 0.25 miles (1320 ft) of any hibernacula or within 150 feet of any maternity tree during the pup season (June 1 – July 31) is prohibited. These restrictions are unlikely to have any impact on any of the proposed projects in the watershed. According to location information available online by the Virginia Department of Game and Inland Fisheries, there are no hibernacula or maternity roost trees in the watershed. If a hibernacula or maternity tree becomes identified, the time of year restriction is very short and unlikely to have much of an affect if any of project construction.

### **5.0 Identified Stormwater Management Projects**

This section describes specific projects that will provide pollutant removal and reduce flooding throughout the Briarfield Watershed. Included in each improvement's description are the potential pollutant removals as well as flood reduction. Project details, the proposed improvements are shown on maps Appendix C.

**Figure 5-1 - Potential Watershed Improvements**

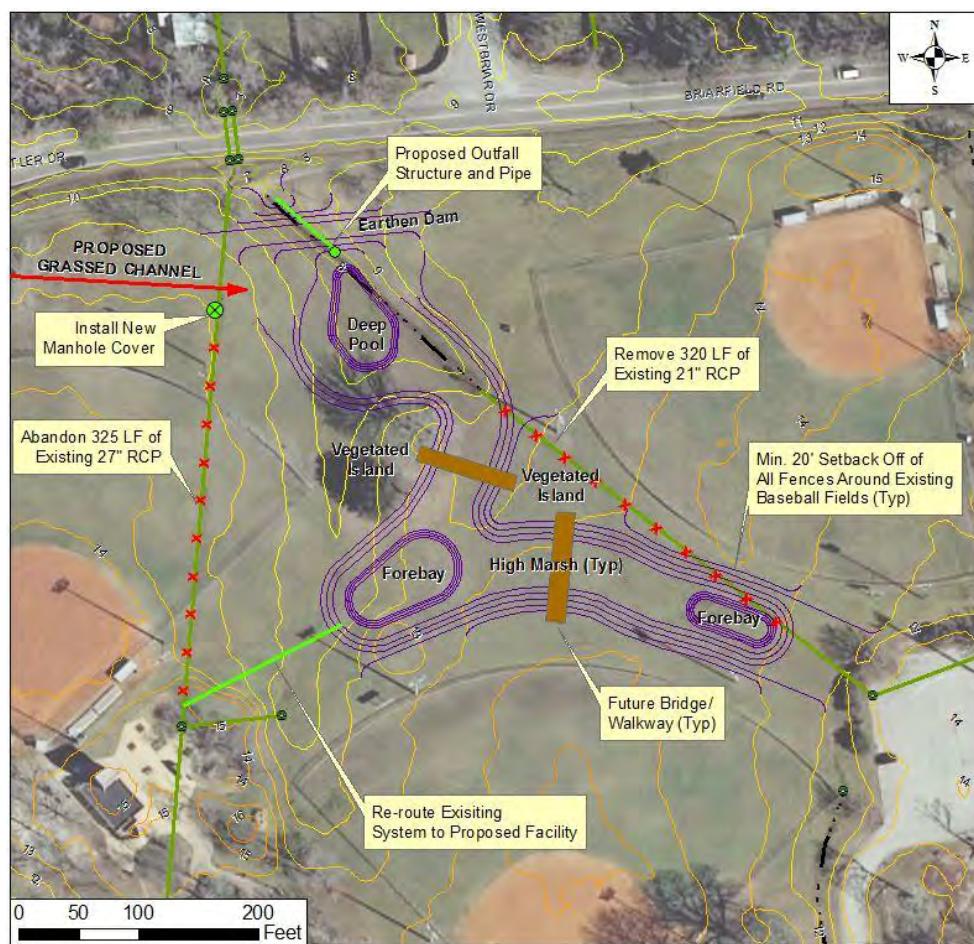


## 5.1 Project Details

### 5.1.1 Location A: Briarfield Park

Briarfield Park is located along Briarfield Road and E Street within the Briarfield Watershed. The Park shares a 41 acre City owned parcel with the Hampton Fire Department Station 9 which includes 4 baseball fields, several parking lots and restroom/concession facilities. There are currently no stormwater quantity/quality control measures on site. However there are conveyance systems such as roadside ditches and an existing storm pipe system. The homes downstream of the park along the stream experience flooding during larger storm events.

The proposed project consists of installing a Level I Constructed Wetland on the northern portion of the site to treat runoff from the park and surrounding area. The proposed facility will treat approximately 21.79 acres achieving a Phosphorus removal credit of 8.99 lbs P/year. Additionally this facility is anticipated to address some of the downstream inundation experienced during heavy storm events. Because these facilities are just upstream and adjacent to the tidally influenced Newmarket Creek, any hydrologic improvements would be negligible. Therefore no additional hydrologic analysis was conducted. The new stormwater facility will outfall to the existing twin 24" culverts crossing under Briarfield Road. Total project costs are \$356,000 and the cost per pound of phosphorus removal is estimated to be \$39,600.



### 5.1.2 Location B: Cesar Tarrant Elementary School

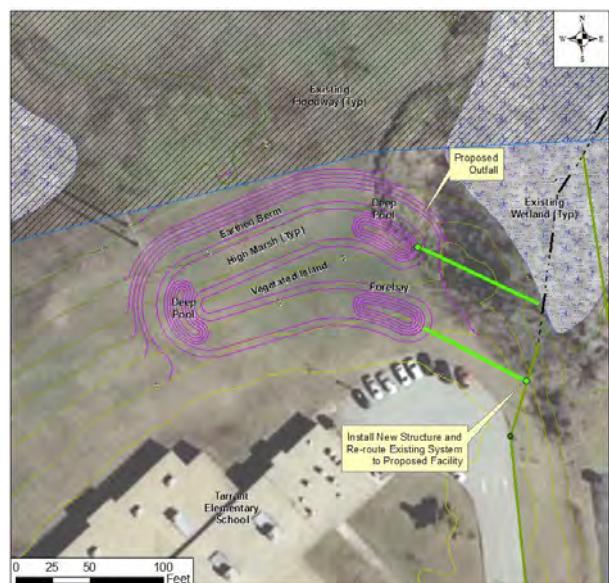
Cesar Tarrant Elementary School sits on an 18.3 acre City owned parcel currently for sale within the Briarfield Watershed. There are currently no stormwater quantity/quality control measures on site. However there are conveyance systems such as roof drains and an existing storm pipe system collecting runoff from the onsite impervious areas. The current conveyance systems collect 5.2 acres of rooftop, parking and surface drainage. The remainder of the site drains to the wetland area on the northern third of the property.

The project consists of installing two Level 1 Constructed Wetlands, with one facility B1 located on the southwest corner of the parcel and facility B2 located on the eastern side of the property. The proposed facilities will treat approximately 6.03 acres achieving a Phosphorus removal credit of 4.05 lbs per year. Both facilities will outfall into existing ditches within the wetlands. Because these facilities are adjacent to the tidally influenced Newmarket Creek, any hydrologic improvements would be negligible. Total Project costs are \$258,000. The cost per pound of phosphorus removal is estimated to be \$63,700.

Facility B1



Facility B2



### 5.1.3 Location C: 1595 Wingfield Drive (Vacant Lot)

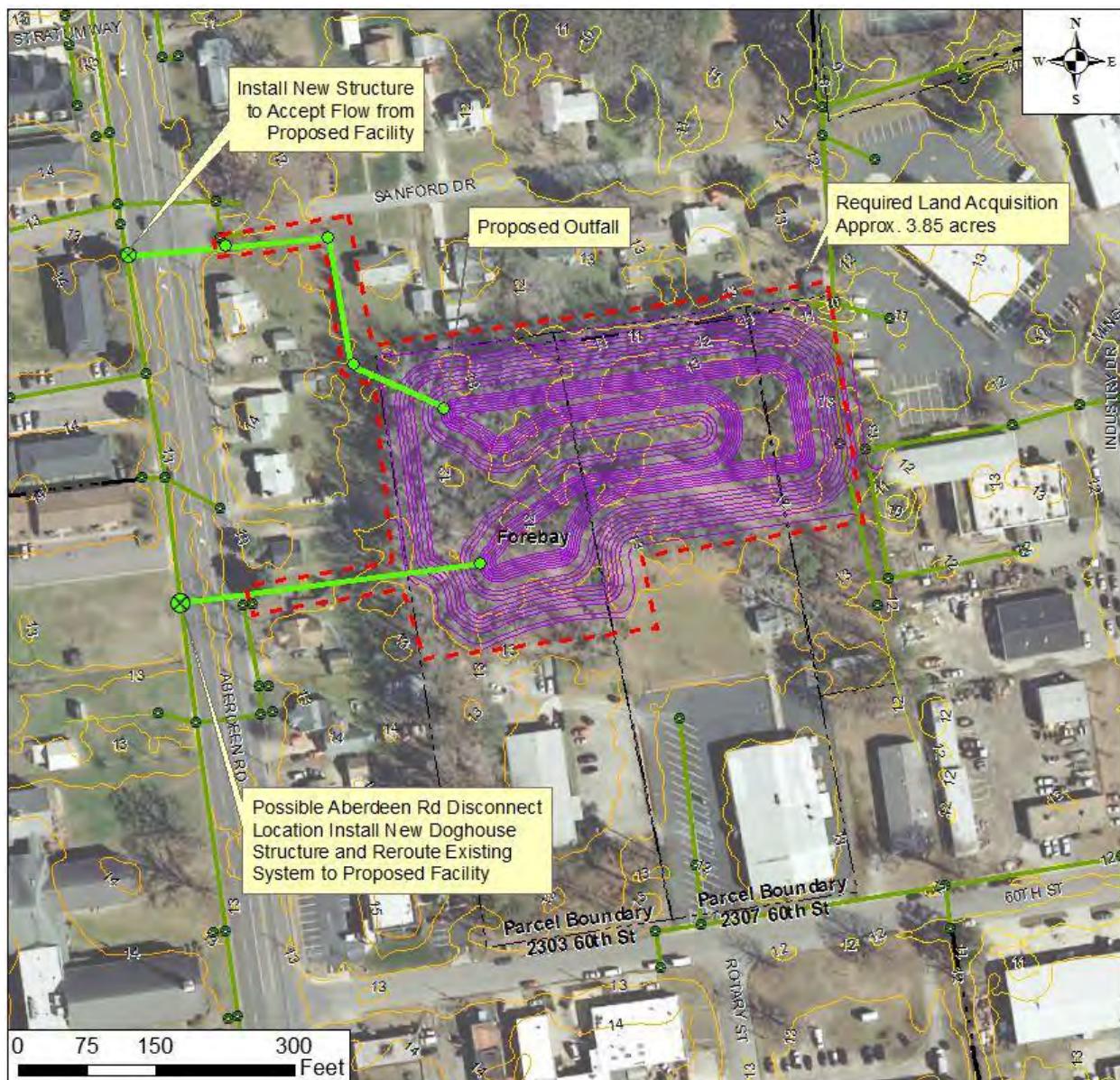
This project is proposed for the vacant lot at 1595 Wingfield Drive. It is a 5.23 acre parcel that is currently for sale. There are currently no stormwater quantity/quality control measures onsite. However there are two wetland ditches running along both the east and west property boundary which receive drainage from 11.66 acres upstream from stormwater collection systems.

A level 1 Wet Pond is proposed to be constructed at this location. The proposed facility will treat approximately 14.09 acres achieving a Phosphorus removal credit of 8.51 lbs per year. The facility will outfall into one of the onsite wetland ditches. Because this facility is adjacent to the tidally influenced Newmarket Creek, any hydrologic improvements would be negligible and additional hydrologic analysis was not conducted. Total Project costs are \$1,091,000. The cost per pound of phosphorus removal is estimated to be \$128,200. This project is very expensive and not on City owned land. Land purchases and easements would add significant additional costs and although it was evaluated it is not recommended for the final implementation plan.



#### 5.1.4 Location D: Aberdeen Road Disconnect

This project will include approximately 4 acres on 3 adjacent parcels behind the residences along Aberdeen Road and Sanford Drive all with wooded acreage on the northern half of the parcels. A Level 1 Wet Pond is proposed for this site which will treat a portion of the storm water, currently conveyed in the closed pipes system, within the Aberdeen Road right-of-way. The area is approximately 30.59 acres achieving a Phosphorus removal reduction of 20.98 lbs per year. The existing stormwater system in Aberdeen Road will need to be modified to divert flows to the proposed facility, then outfall back into the Aberdeen system into an existing downstream structure near Sanford Drive. This project has the potential for reducing hydraulic grade line in the closed pipe system along the Aberdeen corridor. Total Project costs are \$1,466,000. The cost per pound of phosphorus removal is estimated to be \$69,900.



### 5.1.5 Location E: Lindsay Middle School & West Hampton Community Center

Lindsay Middle School and the West Hampton Community Center share a City of Hampton owned parcel located at 1636 and 1638 Briarfield Road. The 26.32 acre parcel has the facility buildings, parking lots, tennis courts, a baseball field, and a track/football field. There are currently no stormwater quantity/quality control measures onsite. There is a large tidal ditch bordering the southern and eastern property lines which drains to majority of the site. There are five existing storm systems collecting drainage onsite, four of which drain directly to the tidal ditch and the fifth system drains, on the western side of the property.

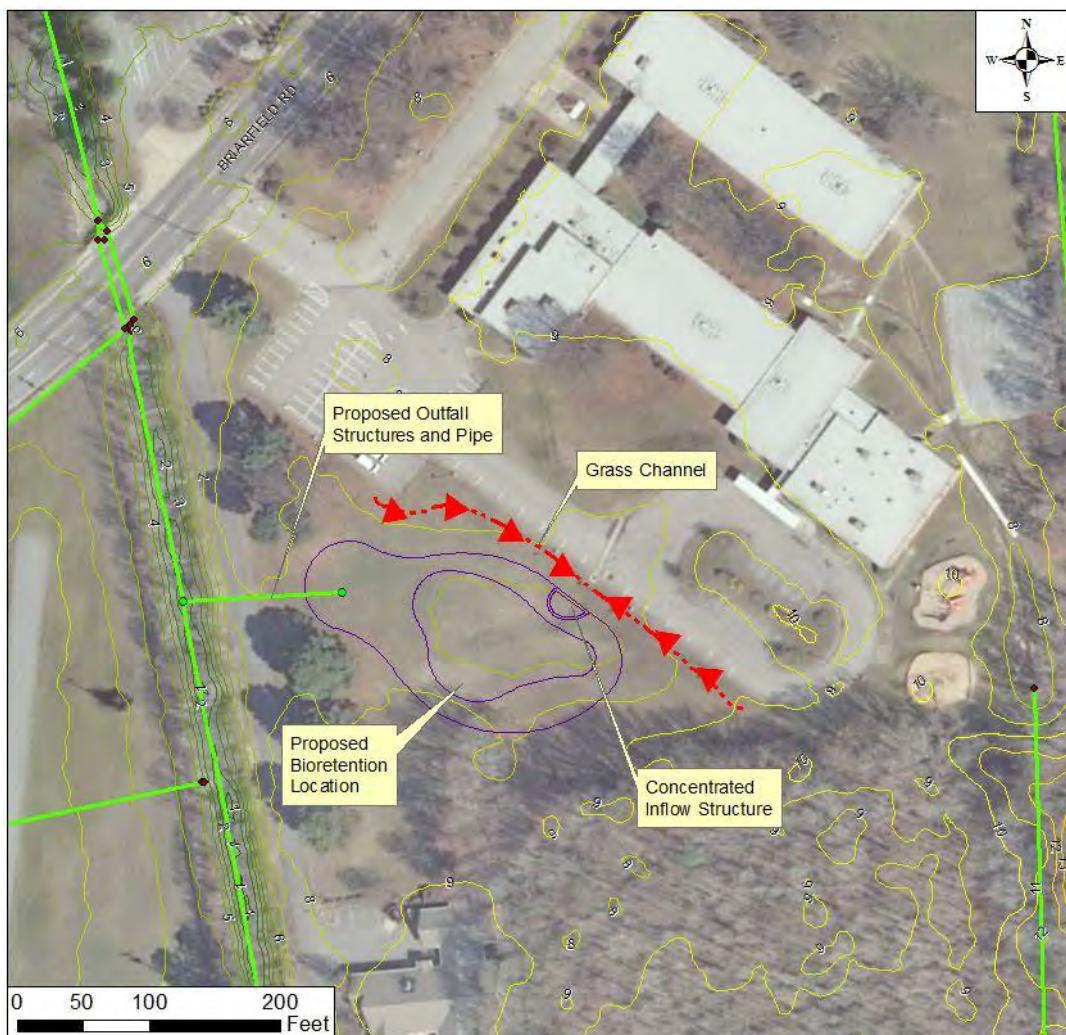
A Level 1 Constructed Wetland facility is proposed at this location that will treat approximately 16.32 acres achieving a Phosphorus removal credit of 8.91 lbs per year. Three of the existing systems entering the tidal ditch will need to be intercepted and directed to the proposed facility, then outfall back into the tidal ditch near the southeast corner of the property. Because this facility is adjacent to the tidally influenced open channel, any hydrologic improvements would be negligible. Total Project costs are \$399,000. The cost per pound of phosphorus removal is estimated to be \$44,800.



### 5.1.6 Location F: Robert E. Lee Elementary School

Robert E. Lee Elementary School is located between Lindsay Middle School and the Powhatan Park subdivision off of Briarfield Road. There are currently no stormwater quantity/quality control measures onsite; however, there is large tidal ditch on the west perimeter of the elementary school. The tidal ditch currently collects drainage from an estimated 14 acres, directs drainage across Briarfield Road and discharges into Newmarket Creek. Although, site reconnaissance confirms stormwater inlets on the elementary school property, survey of the stormwater structures and pipelines are currently not available.

A level 1 bio-retention basin, approximately 0.23 acres in size, is proposed to treat the stormwater drainage. The proposed facility will treat 6.37 acres of the school site, achieving a Phosphorus removal credit of 4.90 lbs per year. Because this facility is adjacent to the tidally influenced open channel, any hydrologic improvements would be negligible. Total Project costs are \$267,000. The cost of phosphorus removal is approximately \$54,500 per pound.



### 5.1.7 Location G: Tidal Ditch Improvements

There is a network of tidally influenced ditches which convey runoff from approximately 342 acres in the Briarfield Watershed between Hwy 664 and Newmarket Creek. The section of tidal drainage ditch being considered for improvements is 2300 linear feet beginning at the southeastern property boundary of Lindsay Middle School and West Hampton Community Center and ending on the upstream side of the large culvert crossing underneath Briarfield Road.

Due to the ditch being tidally influenced it is not eligible for normal BMP conversion credits. It is however a prime candidate for the credit for the sedimentation protocol as described in the *Recommendations of the Expert Panel to Define Removal Rates for Shoreline Management Projects*; the guidelines document prepared by an expert panel on shoreline restorations and approved by DEQ. The guidelines state that under the sedimentation protocol projects that create tidal wetlands are eligible for 5.289 lb P/acre/yr of removal credit. The current design for the proposed tidal ditch improvements will achieve a 5.584 lb P/yr removal credit. Because this facility is adjacent to the tidally influenced open channel, any hydrologic improvements would be negligible. Total Project costs are \$266,000. The cost per pound of phosphorus removal is estimated to be \$47,700.

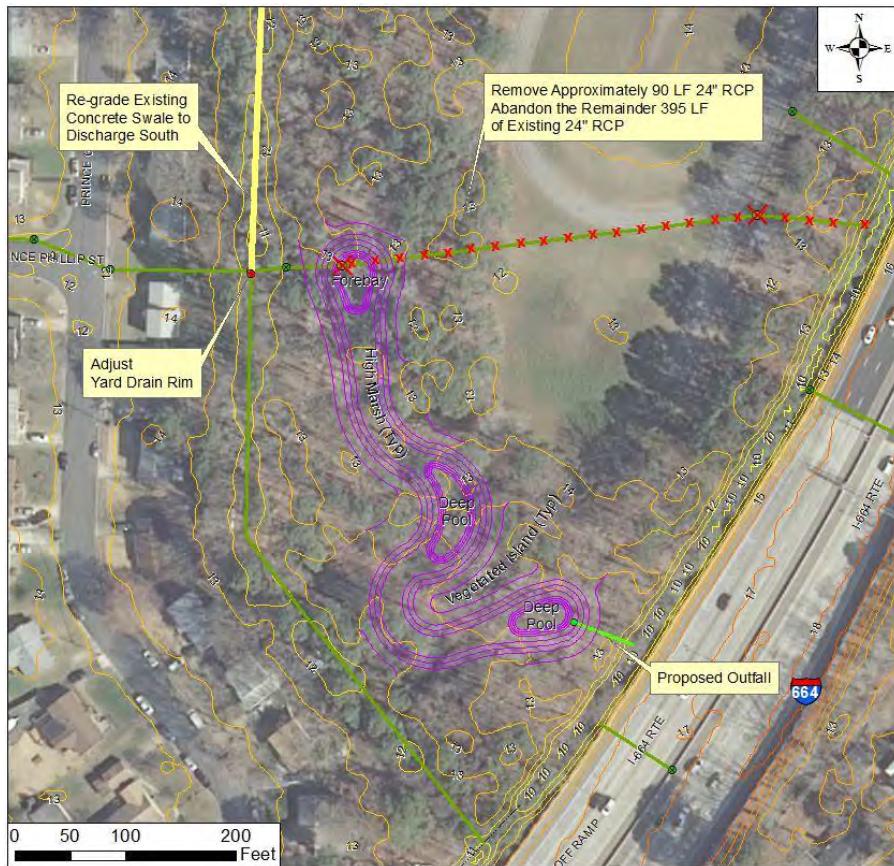


### 5.1.8 Location H: Hampton High School (South)

Hampton High School is located within the Hampton Terrace district of the Briarfield Watershed. The City owned parcel drains a total 26.6 acres which consists of a portion of the campus' athletic grounds including a running track and baseball fields. Additionally there are 21.5 acres to the west of which some area drains to Queen Street and some drains across the southern portion of the property into an existing roadside ditch along I-664.

There are currently no stormwater quantity/quality control measures on site; however, there are conveyance systems within the neighborhood to the west and on the perimeter of the school site. Interstate 664 outlines the East side of the Hampton High School property with a parallel drainage ditch. A stormwater system is collecting approximately half of the adjacent neighborhood drainage, conveying the stormwater in a closed pipe system across the school site and discharging into the concrete swale west of the campus.

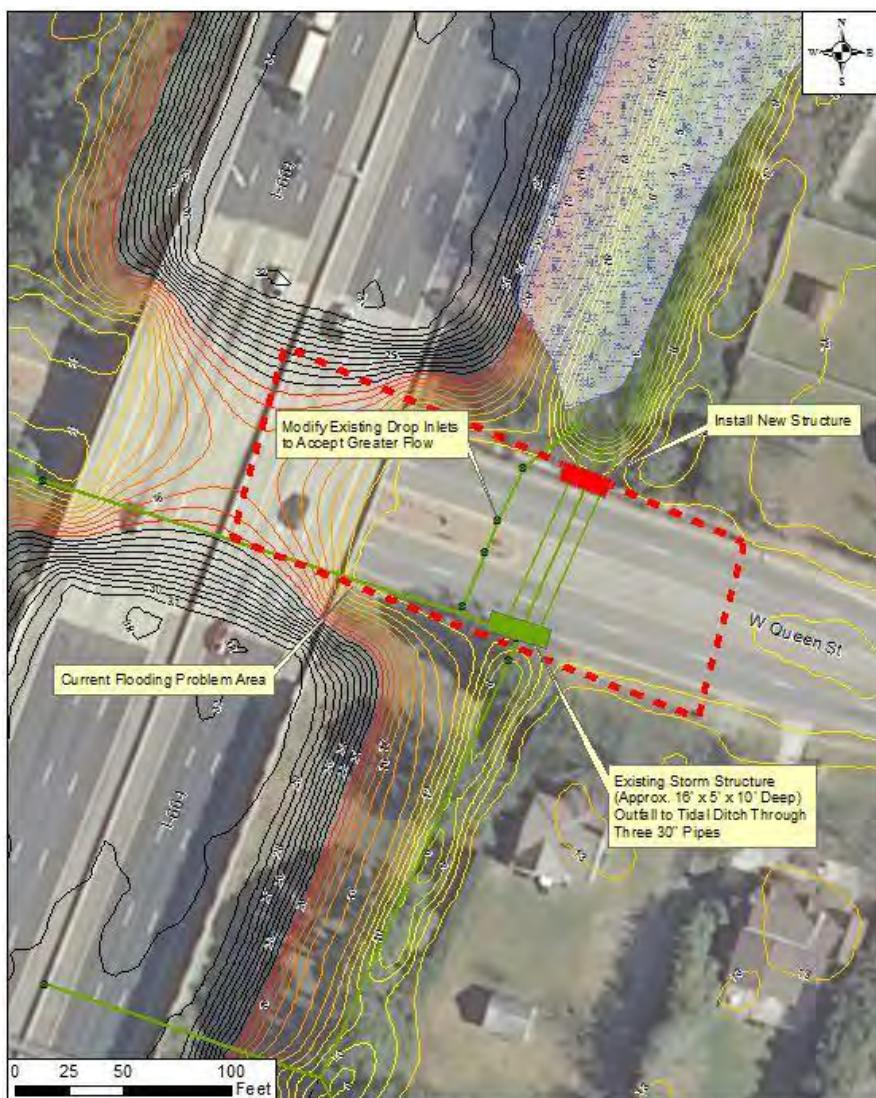
A level I constructed wetland, approximately 3 acres in size, is proposed to be installed on-site south of the athletic grounds in an existing wooded area. The new facility will outfall to the drainage ditch paralleling I-664. The proposed facility will treat approximately 48 acres achieving a Phosphorus removal of 41.84 lbs per year. This project would discharge to a downstream open channel and is unlikely to have any affect or improvements to any flooding or drainage issues. Total Project costs are \$700,000. The cost per pound of phosphorus removal is estimated to be \$16,800.



### 5.1.9 Location I: West Queen Street Crossing

Significant flooding currently occurs on West Queen Street at the I-664 overpass. Approximately 5 acres of surface runoff to West Queen Street collects at a low point just east of the overpass. The existing system in this location is not adequately sized to adequately drain the water from the road and the underpass stays flooded after larger rainfall events for upwards of 24 hours. Just over 22 acres drain through the existing system which collects drainage from a portion of West Queen Street, Hampton High School, I-664 runoff, and the neighborhood off of Azalea Drive. Drainage converges at a large structure and discharges to a tidally influenced ditch on the north side of West Queen Street through three 30" pipes. Additionally there is a standalone system in place to drain the road at the low point where flooding occurs, however this system is undersized.

To help alleviate the current flooding that occurs in this area and to get the water off of West Queen Street, the existing standalone system will be modified to accept more flow. Additionally a large structure will be placed on the north side of West Queen Street to help alleviate flooding. This structure will intercept and discharge through the three existing 30" storm pipes. This project will not provide any POC removal credits and will cost approximately \$168,000 to complete.

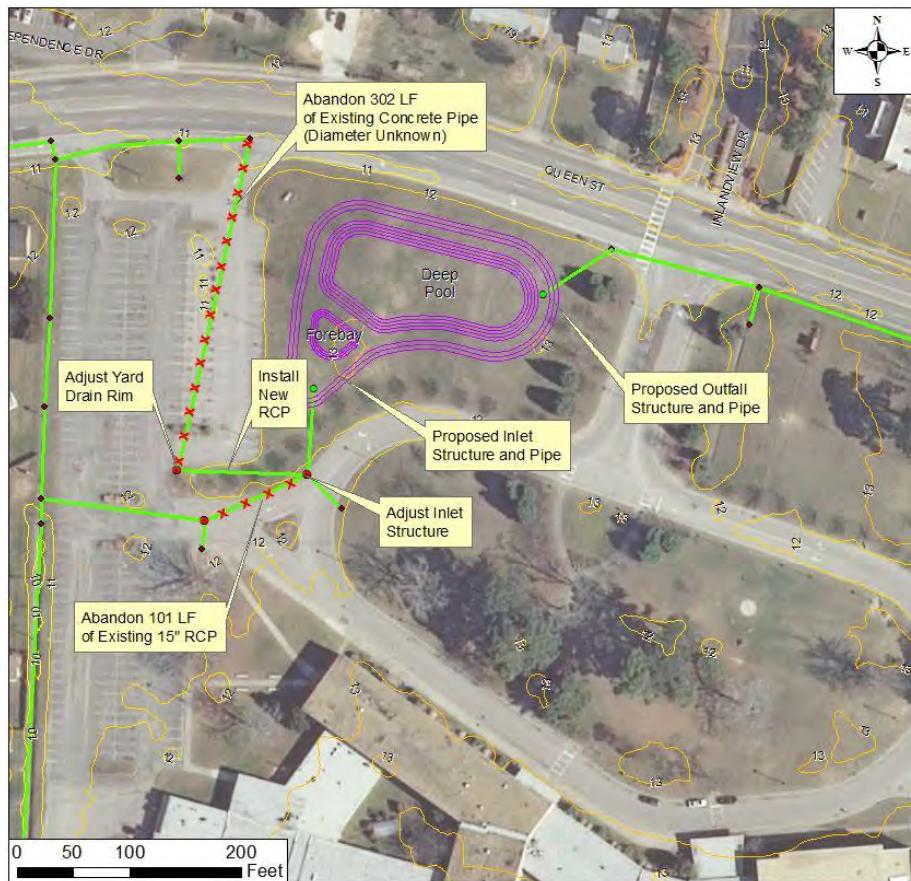


### 5.1.10 Location J: Hampton High School (North)

Hampton High School is located within the Hampton Terrace district of the Briarfield Watershed in Hampton, VA. The City of Hampton owned parcel collects drainage from a total 12 acres of Hampton High School consisting of vehicle parking and sidewalks for the campus.

There are currently no stormwater quantity/quality control measures on site; however, there are conveyance systems such as a concrete swale, Queen Street storm pipe system, and a drainage ditch surrounding the northern part of the school. All stormwater is conveyed through the Queen Street storm drainage pipe system and directed towards Newmarket Creek. Interstate 664 borders the East side of the Hampton High School property with a parallel drainage ditch.

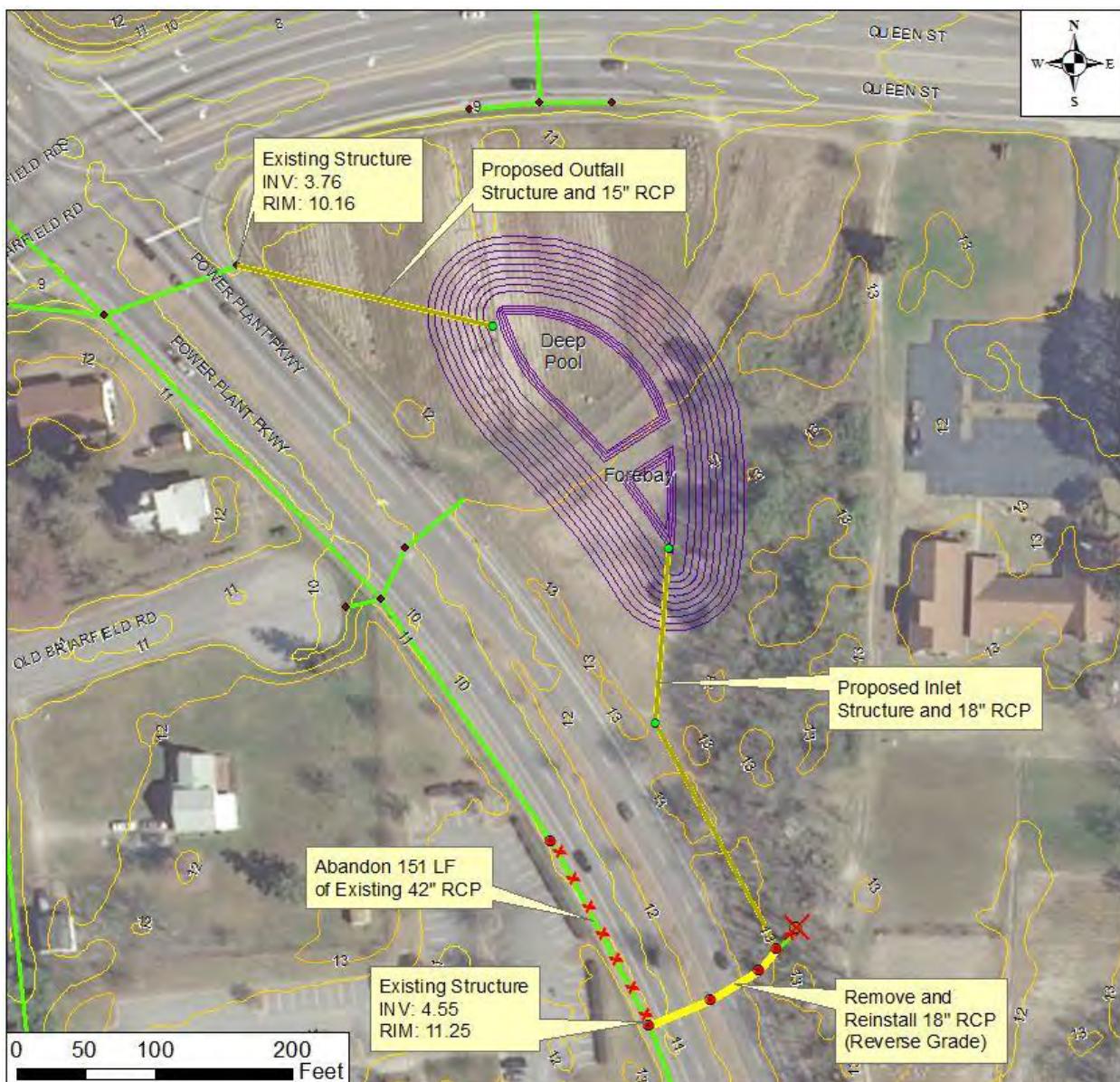
A level I wet pond, approximately 0.34 acres in size, will be installed onsite north of the campus adjacent to the parking lot. The proposed facility will treat approximately 12 acres achieving a Phosphorus removal of 7.86 lbs per year. The new facility will outfall to the existing drainage pipe system paralleling the eastbound lane of Queen Street. This project intends to alleviate localized flooding within Queen Street right-of-way and more specifically near the I-664 overpass. Total Project costs are \$276,000. The cost per pound of phosphorus removal is estimated to be \$35,200.



### 5.1.11 Location K: Powerplant Parkway and Queen Street

This project is located at the intersection of Queen Street and Power Plant Parkway. The owns this parcel that collects drainage primarily from the surrounding roadways

There are currently no stormwater quantity/quality control measures on site; however, there are conveyance systems that could be diverted into a stormwater Level 1 Pond at that location. This project was not fully developed due to the relatively higher elevation ground making it very difficult and costly to convey water into and discharge out of any facility constructed on this site. Therefore it is not included in the final recommended plan.



## 5.2 Recommended Plan

The Briarfield Watershed offers several low cost opportunities to provide pollutant removal projects at a reasonable cost due to the availability of City owned parcels in favorable locations within the sub-watersheds. Based on the results of the project evaluations, the following projects are recommended for inclusion into the City's overall watershed master plan projects.

Table 5.1 Summary of Recommended Plan

Location	Description	Proposed Practice	Cost	Pollutant Removals (lb/year)			\$/lb P	Additional Flood Reduction Benefits
				N	P	SS		
A	Briarfield Park	Level I Constructed Wetland	\$ 356,000	32.15	8.99	2959.00	\$39,600	
B	Cesar Tarrant Elementary School (CLOSED)	Level I Constructed Wetland (x2)	\$ 258,000	14.47	4.05	1252.91	\$63,800	
D	Aberdeen Rd Disconnect - Upstream	Level I Wet Pond	\$1,466,000	66.7	20.98	6357.95	\$69,900	Reduces Flooding From Aberdeen System
E	Lindsay Middle School & West Hampton Community Center	Level I Constructed Wetland	\$ 399,000	31.88	8.91	2838.92	\$44,800	
F	Robert E. Lee Elementary School	Level I Bioretention Basin	\$ 267,000	63.71	4.9	1614.87	\$54,500	
G	Tidal Ditch Improvements	Shoreline Management Sedimentation (Constructed Tidal Wetlands)	\$ 266,000	N/A	5.584	7347.15	\$47,700	
H	Hampton High School	Level I Constructed Wetland	\$ 700,000	149.67	41.84	12432.98	\$16,800	
I	W Queen Street Storm System Improvements	Flood Alleviation	\$ 168,000	N/A	N/A	N/A	N/A	Reduces Underpass Flooding
J	Hampton High School	Level I Wet Pond	\$ 276,000	25.00	7.86	2398.50	\$35,200	

The project at location C on Wingfield Drive is not recommended at this point. This project was identified and evaluated since it was thought to be located on a City owned parcel and able to provide quality benefits as well as flood reduction benefits by relieving flows from the overloaded Aberdeen system. However, the project would require land purchase and the parcel is at an elevation that is too high to be able to cost effectively receive diverted stormwater flows. Therefore it is not recommended as a preferred project.

## 6.0 Potential Funding Sources

Several grant and funding programs are available to the City for possible project funding depending on current funding levels, program priorities in the desired funding cycle, total project costs, City matching funds and project details. Recommendations are for the City to follow these programs and others and to select possible funding targets and to meet with the program administrator to discuss project details prior to the funding announcement. Minor nuisances in the funding package submittal and presentation may increase the City's chances of obtaining approval.

### 6.1 National Fish and Wildlife Foundation (NFWF) Programs

NFWF's has several grant programs that target water quality and habitat improvement projects which could be used to fund proposed Briarfield Watershed projects.

**Chesapeake Bay Stewardship Fund** is available to help local communities restore the Bay by funding projects that clean up and restore their polluted rivers and streams. These projects can include stormwater projects especially if they have a restoration component and there are matching funds available. The Stewardship Fund awards \$8 million to \$12 million per year through two competitive grant programs and directed technical assistance. Restoration, stormwater and local government strategies. The two programs include.

- *Small Watershed Grants (SWGs)* of \$20,000 to \$200,000 each are awarded to nonprofit organizations and local governments for projects to protect and improve local waters that contribute to the overall health of the Chesapeake Bay, while building citizen-based resource stewardship. These grants require minimum matching contributions valued at 25% of total project costs.
- *Innovative Nutrient and Sediment Reduction Grants (INSRGs)* of \$200,000 to \$750,000 can be awarded to nonprofit organizations, local governments, universities and state agencies to demonstrate innovative approaches to accelerate adoption of the most cost effective and sustainable approaches to reducing nutrient and sediment pollution to the Chesapeake Bay. These grants encourage matching contributions of 50% or greater of total project costs.

**Environmental Solutions for Communities** In 2012, Wells Fargo and NFWF launched the Environmental Solutions for Communities initiative, designed to support projects that link economic development and community well-being to the stewardship and health of the environment. This five-year initiative is supported through a \$15 million contribution from Wells Fargo that will be used to leverage other public and private investments with an expected total impact of over \$37.5 million.

Funding priorities for this program among several include:

- Conserving critical land and water resources and improving local water quality
- Restoring and managing natural habitat, species and ecosystems that are important to community livelihoods (such as the Bay and its tributaries)

Grants are offered once a year to support priority projects in states and communities where Wells Fargo operates and range from \$25,000 - \$250,000.

## 6.2 Virginia DEQ Funding

DEQ is the state's lead agency for developing and implementing statewide nonpoint source pollution control programs and is the designated lead for acquiring and disbursing various federal, state and nonprofit grant funds. DEQ receives federal funds or funds from nonprofit organizations and foundations and issues "sub-agreements" through grants and agreements. In other cases, DEQ receives funds from the legislature and enters into cooperative agreements and grant agreements.

### 6.2.1 Section 319 Non-Point Source Funding

Federal Section 319 money for non-point source programs is distributed by DEQ through several different programs that vary depending on priorities. Applications for grants and project proposals are sought through requests for applications (RFAs). Once funding is available and applications are received, technical staff from DEQ, other agencies and local government review, score, prioritize and select applications for funding.

### 6.2.2 Virginia DEQ Stormwater Local Assistance Fund (SLAF)

VDEQ administers the Stormwater Local Assistance Funding program (SLAF) that will provide funding to localities throughout Virginia to reduce non-point source pollution from stormwater runoff. The purpose of the fund is to “provide matching grants to local governments for the planning, design, and implementation of stormwater best management practices that address cost efficiency and commitments related to reducing water quality pollutant loads.” Total program funds have varied in past years however DEQ has typically funded projects on a cost-effective basis and has used as a rule of thumb that they will not provide money for projects that cost in excess of \$50,000/pound of phosphorus/year removed.

### 6.2.3 Water Quality Improvement Fund (WQIF)

The Virginia Department of Environmental Quality awards grants from the Water Quality Improvement Fund (WQIF) totaling \$3,400,000 (FY 2017) to nonpoint source (NPS) water quality improvement projects such as

- Stormwater runoff management
- Repair and replacement of failing onsite sewage disposal systems,
- Clean-up of abandoned or orphaned mine lands, and
- Shoreline restoration.

Projects with the highest NPS reductions compared to the dollars requested are given funding priority.

### 6.2.4 Coastal Zone Management (CZM) Programs

The Virginia Coastal Zone Management (CZM) Program is a network of Virginia state agencies and local governments, established in 1986 through an Executive Order, which administers enforceable laws, regulations and policies that protect our coastal resources and foster sustainable development. The Department of Environmental Quality (DEQ) serves as the lead agency for Virginia's program. Virginia is awarded funds based on the size of its coastal population and the length of its tidal shoreline and currently receives about \$3 million annually from the National Oceanic and Atmospheric Administration (NOAA). Department of Environmental Quality also administers the program's annual grant award to state agencies, PDCs and local governments for implementation of the Virginia CZM Program. They prepare an annual grant application which is submitted to NOAA for approval which outlines the state projects the Virginia CZM Program will fund with its annual allocation. If approved, projects begin in October of that year and run through September 30 the following year.

The federal Coastal Zone Management Act (CZMA) has numerous sections, each with specific objectives which are funded on a year to year basis. Funding under Section 306A can be used for the acquisition of fee simple land, easements and construction projects for public access improvements or habitat restoration projects. Section 306A funding must be matched 1:1 by non-federal fund sources.

The City's projects may be eligible for funding under this program.

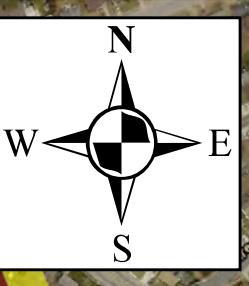
## 6.3 Chesapeake Bay Restoration Fund

In 1995, legislation was passed creating the Chesapeake Bay Restoration Fund Advisory Committee which was given the responsibility of developing goals and guidelines for the use of the moneys collected from the sale of the special Chesapeake Bay license plates. In 2016, this fund awarded nearly \$350,000 to state agencies, local governments, and public or private not-for-profit agencies, institutions, and organizations for projects that would among other priorities:

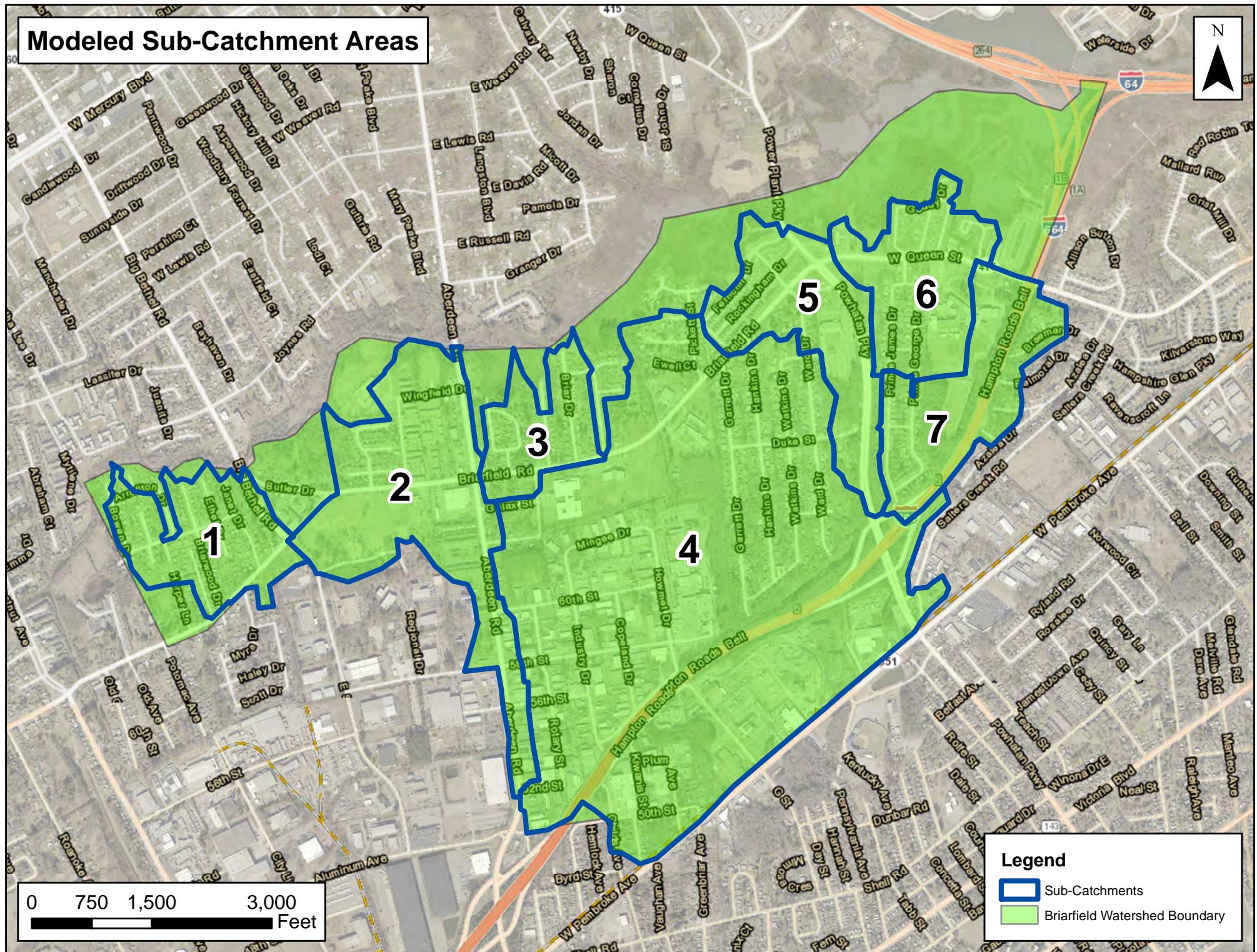
## **Appendix A Storm Sewer Map with Surveyed Structures and Baseline Model Data**

### **Appendix Includes:**

- Storm Sewer Map and Survey Information
- Modeled Sub-Catchment Areas Figure
- NOAA Rainfall Data - Hampton, Virginia
- Sewells Point Tidal Datums
- FEMA Flood Profiles - Newmarket Creek



## Modeled Sub-Catchment Areas





**NOAA Atlas 14, Volume 2, Version 3**  
**Location name: Hampton, Virginia, US\***  
**Latitude: 37.0212°, Longitude: -76.3978°**

**Elevation: 9 ft\***  
\* source: Google Maps



### POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

#### PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.417 (0.379–0.461)	0.491 (0.446–0.542)	0.560 (0.508–0.618)	0.638 (0.576–0.705)	0.719 (0.648–0.793)	0.790 (0.709–0.872)	0.855 (0.763–0.944)	0.918 (0.815–1.01)	0.996 (0.876–1.10)	1.07 (0.933–1.19)
10-min	0.665 (0.605–0.737)	0.785 (0.713–0.868)	0.897 (0.814–0.990)	1.02 (0.922–1.13)	1.15 (1.03–1.26)	1.26 (1.13–1.39)	1.36 (1.21–1.50)	1.46 (1.29–1.61)	1.58 (1.39–1.75)	1.69 (1.47–1.87)
15-min	0.832 (0.756–0.921)	0.987 (0.896–1.09)	1.13 (1.03–1.25)	1.29 (1.17–1.43)	1.45 (1.31–1.60)	1.59 (1.43–1.76)	1.72 (1.53–1.90)	1.84 (1.63–2.03)	1.98 (1.75–2.20)	2.12 (1.84–2.35)
30-min	1.14 (1.04–1.26)	1.36 (1.24–1.51)	1.61 (1.46–1.78)	1.87 (1.69–2.07)	2.15 (1.94–2.37)	2.40 (2.15–2.65)	2.63 (2.35–2.90)	2.86 (2.54–3.16)	3.16 (2.78–3.50)	3.42 (2.99–3.80)
60-min	1.42 (1.29–1.57)	1.71 (1.55–1.89)	2.07 (1.88–2.28)	2.44 (2.20–2.69)	2.87 (2.58–3.16)	3.25 (2.92–3.59)	3.62 (3.23–4.00)	4.01 (3.56–4.43)	4.53 (3.98–5.02)	5.00 (4.36–5.55)
2-hr	1.69 (1.52–1.87)	2.03 (1.83–2.24)	2.49 (2.25–2.76)	2.99 (2.69–3.30)	3.58 (3.21–3.95)	4.13 (3.68–4.56)	4.68 (4.14–5.16)	5.26 (4.63–5.81)	6.06 (5.28–6.69)	6.79 (5.87–7.51)
3-hr	1.81 (1.63–2.03)	2.18 (1.96–2.43)	2.69 (2.41–3.00)	3.24 (2.90–3.61)	3.92 (3.49–4.36)	4.57 (4.04–5.07)	5.22 (4.59–5.79)	5.93 (5.17–6.57)	6.92 (5.98–7.67)	7.85 (6.71–8.71)
6-hr	2.18 (1.96–2.46)	2.62 (2.34–2.94)	3.23 (2.89–3.63)	3.90 (3.47–4.38)	4.75 (4.21–5.31)	5.56 (4.89–6.19)	6.38 (5.57–7.11)	7.29 (6.31–8.11)	8.57 (7.32–9.54)	9.78 (8.26–10.9)
12-hr	2.58 (2.30–2.93)	3.08 (2.74–3.50)	3.83 (3.40–4.34)	4.65 (4.11–5.26)	5.71 (5.01–6.44)	6.73 (5.86–7.58)	7.80 (6.73–8.76)	8.98 (7.67–10.1)	10.7 (8.98–12.0)	12.3 (10.2–13.8)
24-hr	2.94 (2.72–3.22)	3.58 (3.31–3.92)	4.64 (4.27–5.08)	5.54 (5.09–6.05)	6.87 (6.26–7.49)	8.03 (7.26–8.74)	9.31 (8.34–10.1)	10.7 (9.52–11.7)	12.9 (11.2–14.0)	14.7 (12.6–16.0)
2-day	3.41 (3.15–3.74)	4.14 (3.82–4.54)	5.34 (4.92–5.85)	6.36 (5.84–6.96)	7.91 (7.20–8.64)	9.26 (8.37–10.1)	10.8 (9.63–11.7)	12.4 (11.0–13.6)	15.0 (13.0–16.4)	17.2 (14.7–18.9)
3-day	3.61 (3.33–3.95)	4.38 (4.05–4.79)	5.62 (5.18–6.14)	6.67 (6.13–7.27)	8.23 (7.51–8.96)	9.57 (8.67–10.4)	11.0 (9.91–12.0)	12.7 (11.3–13.8)	15.1 (13.2–16.6)	17.3 (14.9–19.0)
4-day	3.81 (3.52–4.16)	4.62 (4.28–5.04)	5.90 (5.45–6.43)	6.98 (6.42–7.58)	8.55 (7.81–9.27)	9.88 (8.97–10.7)	11.3 (10.2–12.3)	12.9 (11.5–14.1)	15.3 (13.4–16.7)	17.5 (15.2–19.1)
7-day	4.46 (4.15–4.82)	5.38 (5.00–5.81)	6.77 (6.28–7.31)	7.94 (7.34–8.55)	9.62 (8.85–10.4)	11.0 (10.1–11.9)	12.6 (11.4–13.5)	14.2 (12.8–15.4)	16.7 (14.7–18.0)	18.7 (16.3–20.3)
10-day	5.07 (4.74–5.45)	6.09 (5.69–6.54)	7.56 (7.04–8.12)	8.77 (8.15–9.40)	10.5 (9.73–11.3)	12.0 (11.0–12.8)	13.5 (12.3–14.5)	15.2 (13.7–16.3)	17.6 (15.7–18.9)	19.6 (17.3–21.2)
20-day	6.89 (6.44–7.38)	8.20 (7.68–8.78)	9.95 (9.31–10.7)	11.4 (10.6–12.2)	13.4 (12.4–14.3)	15.1 (13.9–16.1)	16.8 (15.4–18.0)	18.6 (16.9–19.9)	21.1 (19.0–22.7)	23.2 (20.6–25.1)
30-day	8.51 (8.02–9.07)	10.1 (9.53–10.8)	12.1 (11.4–12.9)	13.7 (12.9–14.6)	15.9 (14.9–17.0)	17.7 (16.5–18.8)	19.5 (18.1–20.8)	21.3 (19.7–22.8)	23.8 (21.8–25.6)	25.8 (23.4–27.8)
45-day	10.6 (10.0–11.3)	12.5 (11.8–13.3)	14.9 (14.0–15.8)	16.8 (15.8–17.8)	19.4 (18.2–20.6)	21.5 (20.0–22.8)	23.6 (21.9–25.1)	25.8 (23.8–27.5)	28.8 (26.3–30.8)	31.2 (28.2–33.4)
60-day	12.7 (12.0–13.4)	14.9 (14.1–15.8)	17.5 (16.6–18.6)	19.5 (18.5–20.7)	22.3 (21.0–23.6)	24.4 (22.9–25.9)	26.5 (24.8–28.1)	28.6 (26.6–30.4)	31.4 (29.0–33.5)	33.5 (30.7–35.9)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

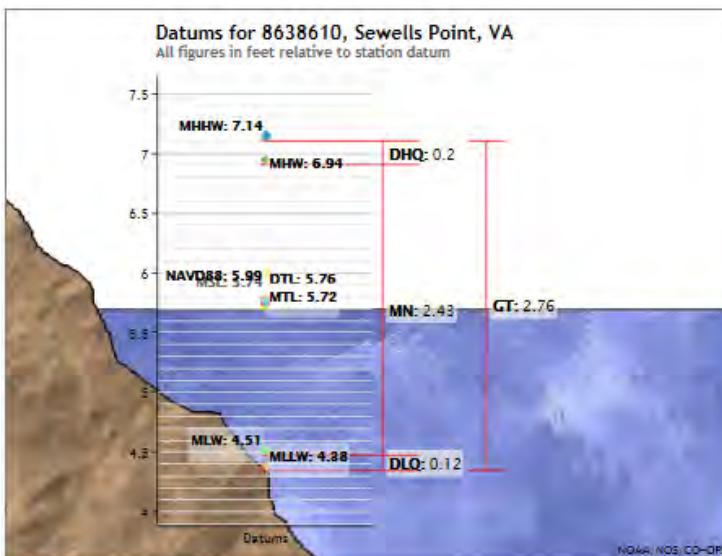
#### PF graphical

### Elevations on Station Datum

Station:	8638610, Sewells Point, VA	T.M.: 75
Status:	Accepted (Jul 25 2013)	Epoch: 1983-2001
Units:	Feet	Datum: STND
Datum	Value	Description
MHHW	7.14	Mean Higher-High Water
MHW	6.94	Mean High Water
MTL	5.72	Mean Tide Level
MSL	5.74	Mean Sea Level
DTL	5.76	Mean Diurnal Tide Level
MLW	4.51	Mean Low Water
MLLW	4.38	Mean Lower-Low Water
NAVD88	5.99	North American Vertical Datum of 1988
STND	0.00	Station Datum
GT	2.76	Great Diurnal Range
MN	2.43	Mean Range of Tide
DHQ	0.20	Mean Diurnal High Water Inequality
DLQ	0.12	Mean Diurnal Low Water Inequality
HWI	1.55	Greenwich High Water Interval (in hours)
LWI	7.83	Greenwich Low Water Interval (in hours)
Maximum	12.40	Highest Observed Water Level
Max Date & Time	08/23/1933 09:18	Highest Observed Water Level Date and Time
Minimum	0.80	Lowest Observed Water Level
Min Date & Time	01/31/1986 15:00	Lowest Observed Water Level Date and Time
HAT	8.01	Highest Astronomical Tide
HAT Date & Time	10/16/1993 14:12	HAT Date and Time
LAT	3.66	Lowest Astronomical Tide
LAT Date & Time	01/21/1996 08:12	LAT Date and Time

### Tidal Datum Analysis Periods

01/01/1983 - 12/31/2001



Showing datums for

8638610 Sewells Point, VA

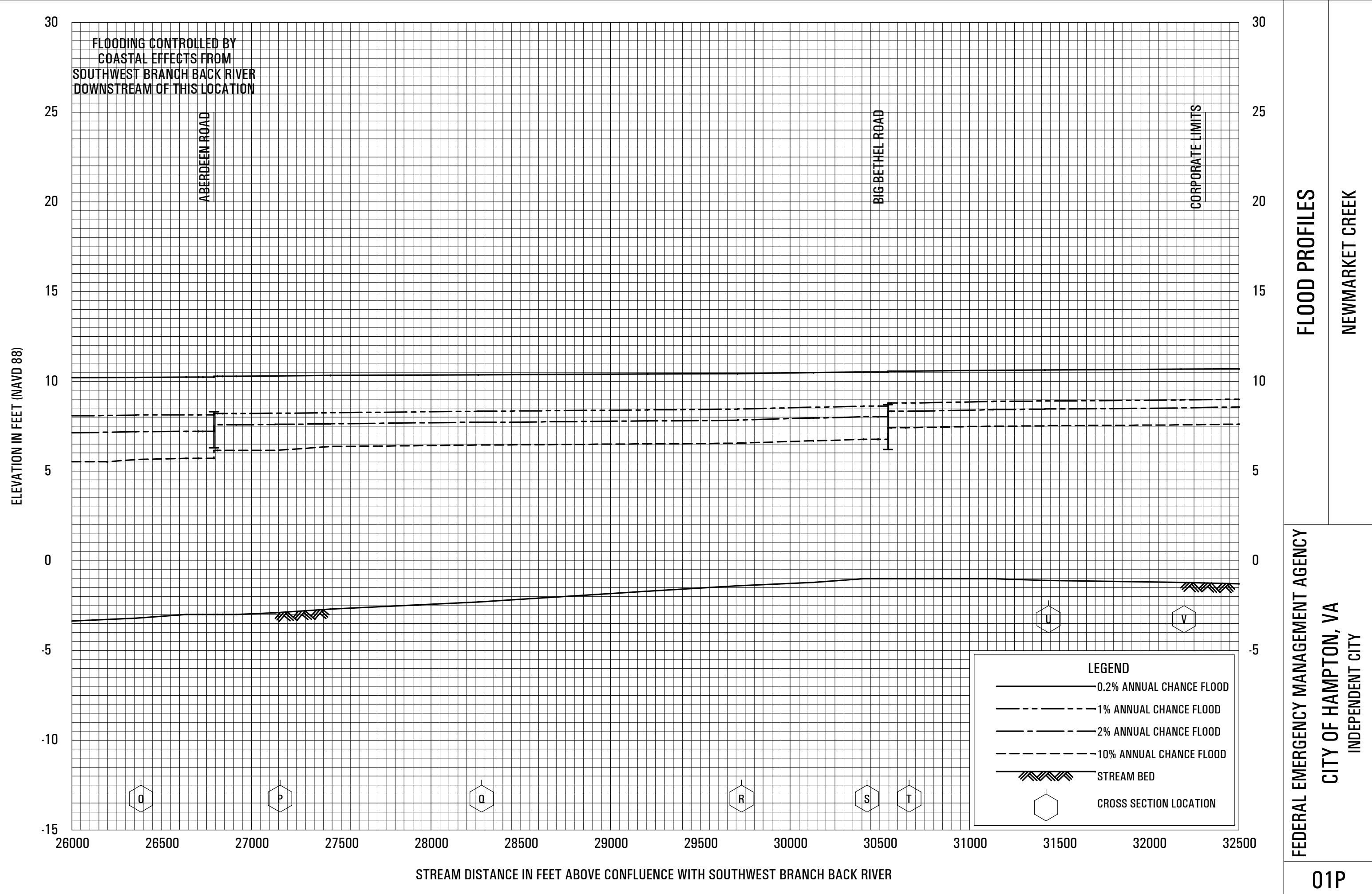
Data Units  Feet

Meters

Epoch  Present (1983-2001)

Superseded (1960-1978)

**Submit**

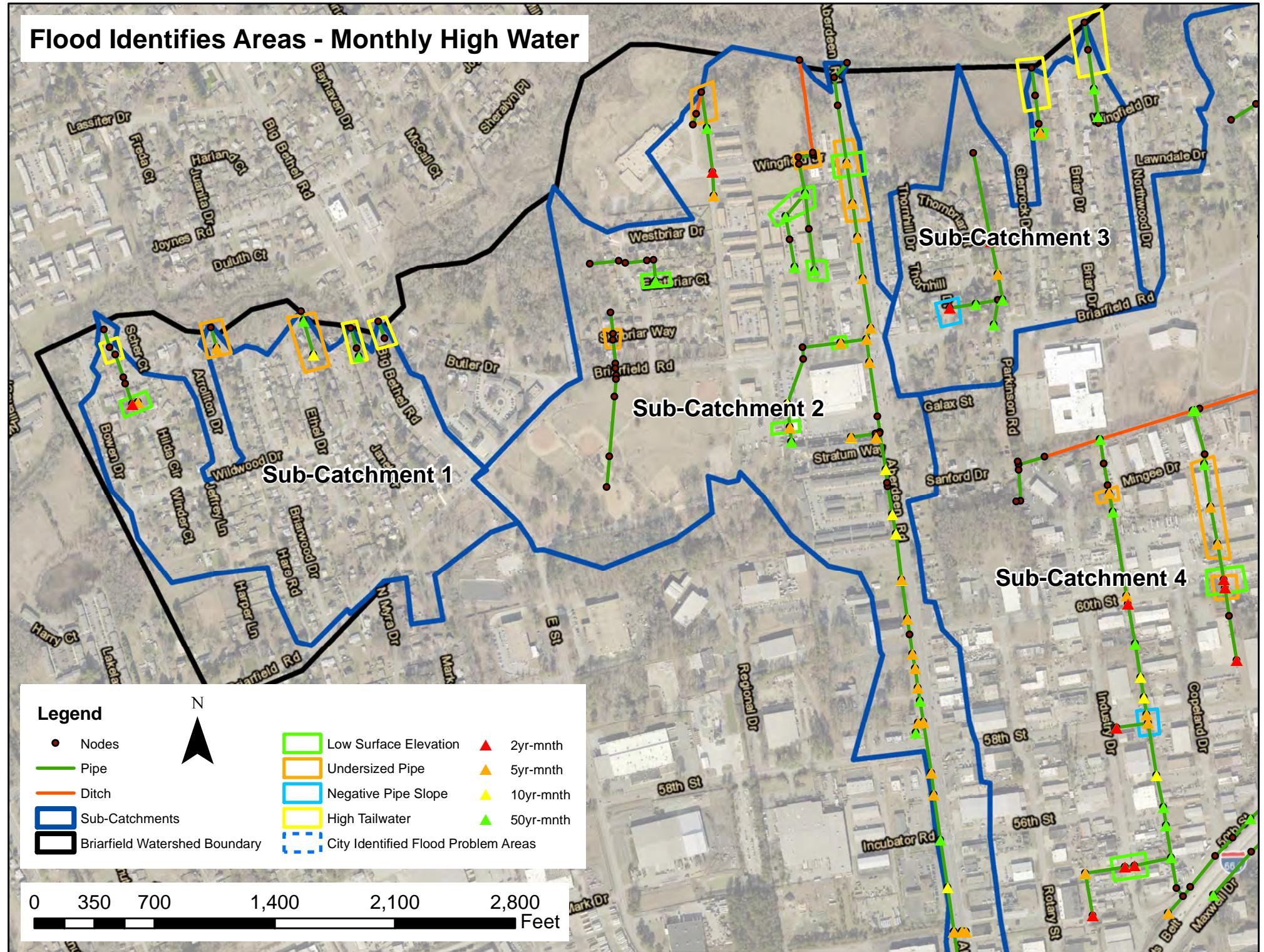


## **Appendix B SWMM Model Results**

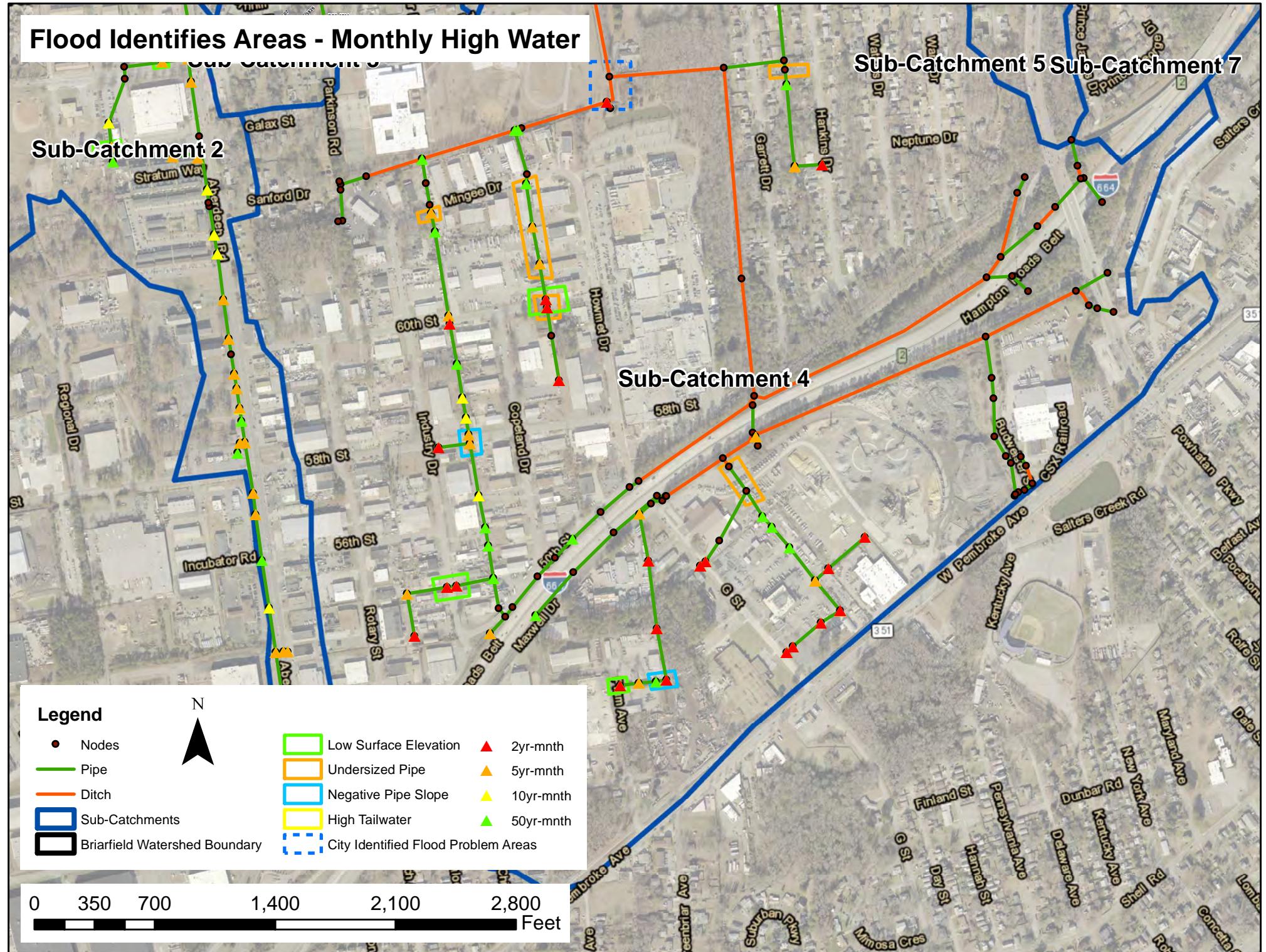
### **Appendix Includes:**

- Part 1 - Model Result Figures
  - Monthly High Tailwater Conditions
  - 10 Year Tailwater Conditions
- Part 2 - Model Analysis Example  
Segments 1 - 8, Plans & Profiles

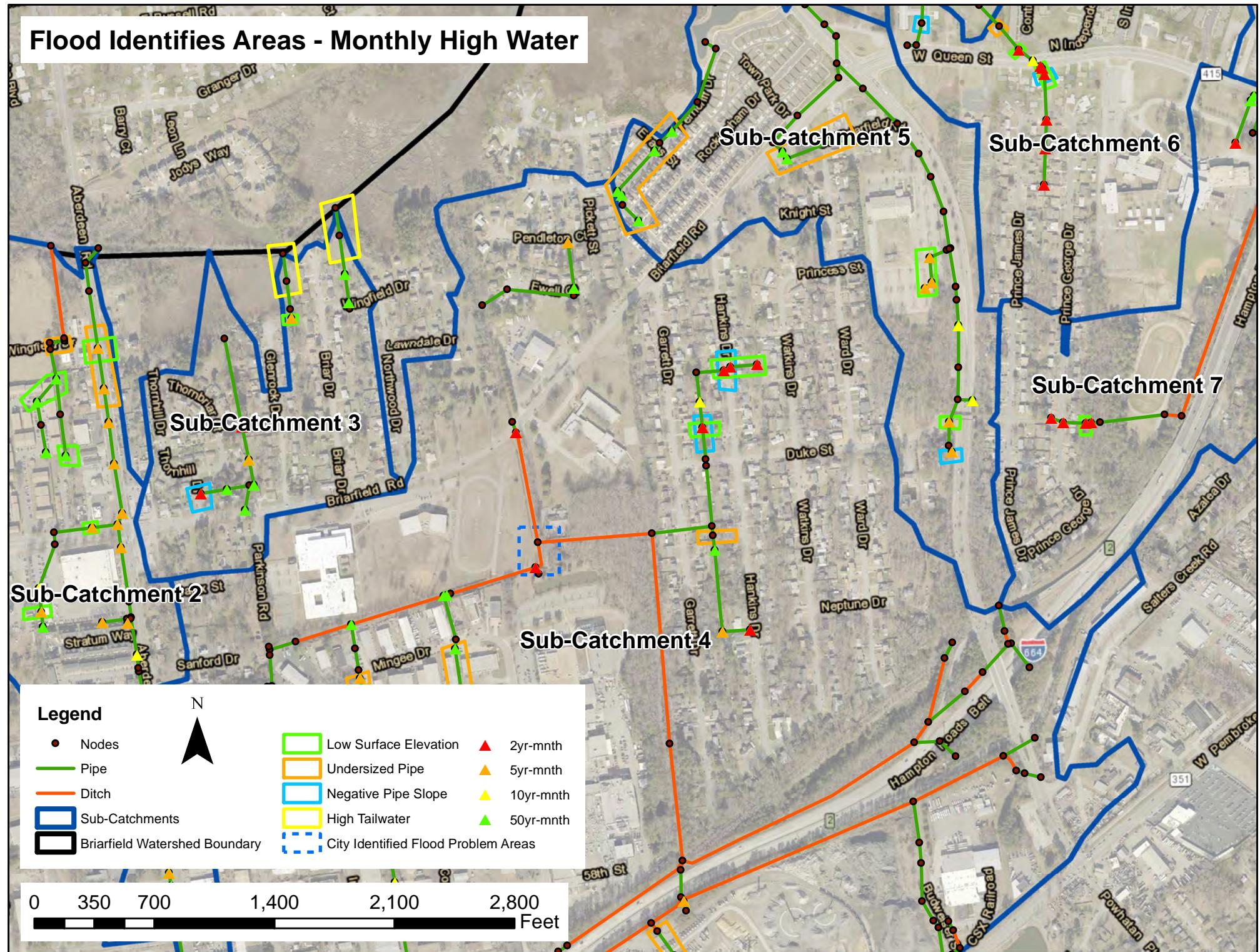
## Flood Identifies Areas - Monthly High Water



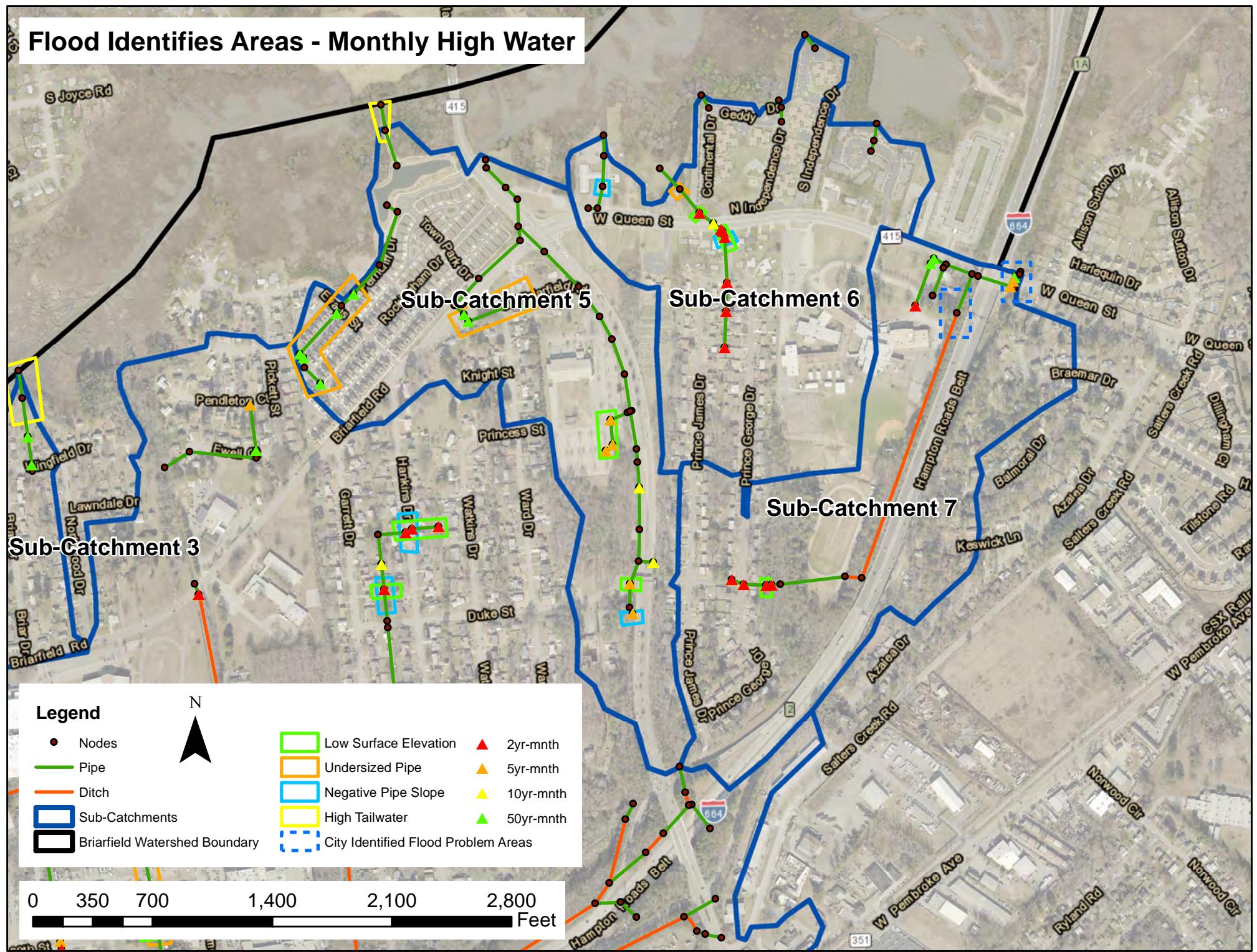
## Flood Identifies Areas - Monthly High Water



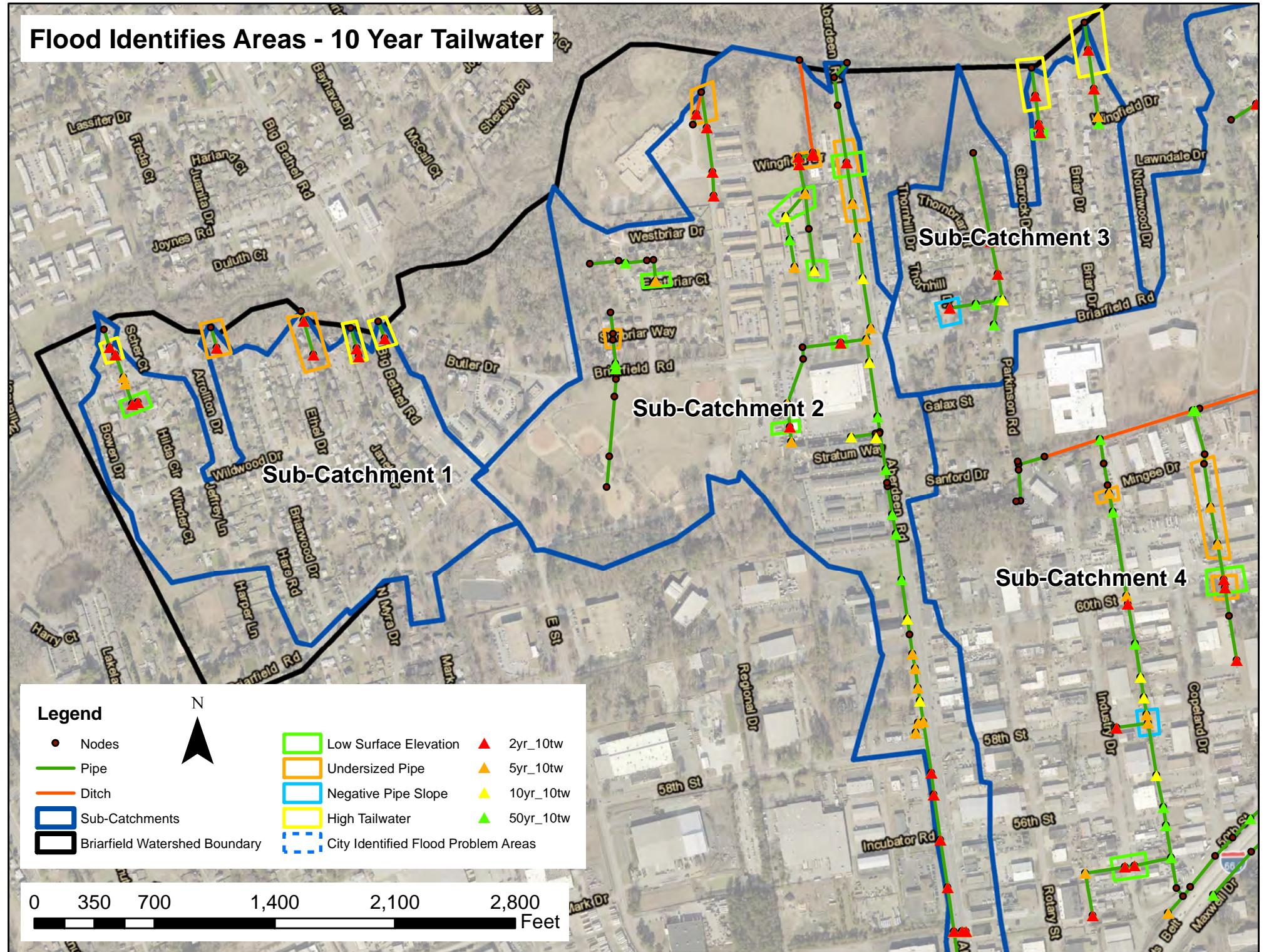
## Flood Identifies Areas - Monthly High Water



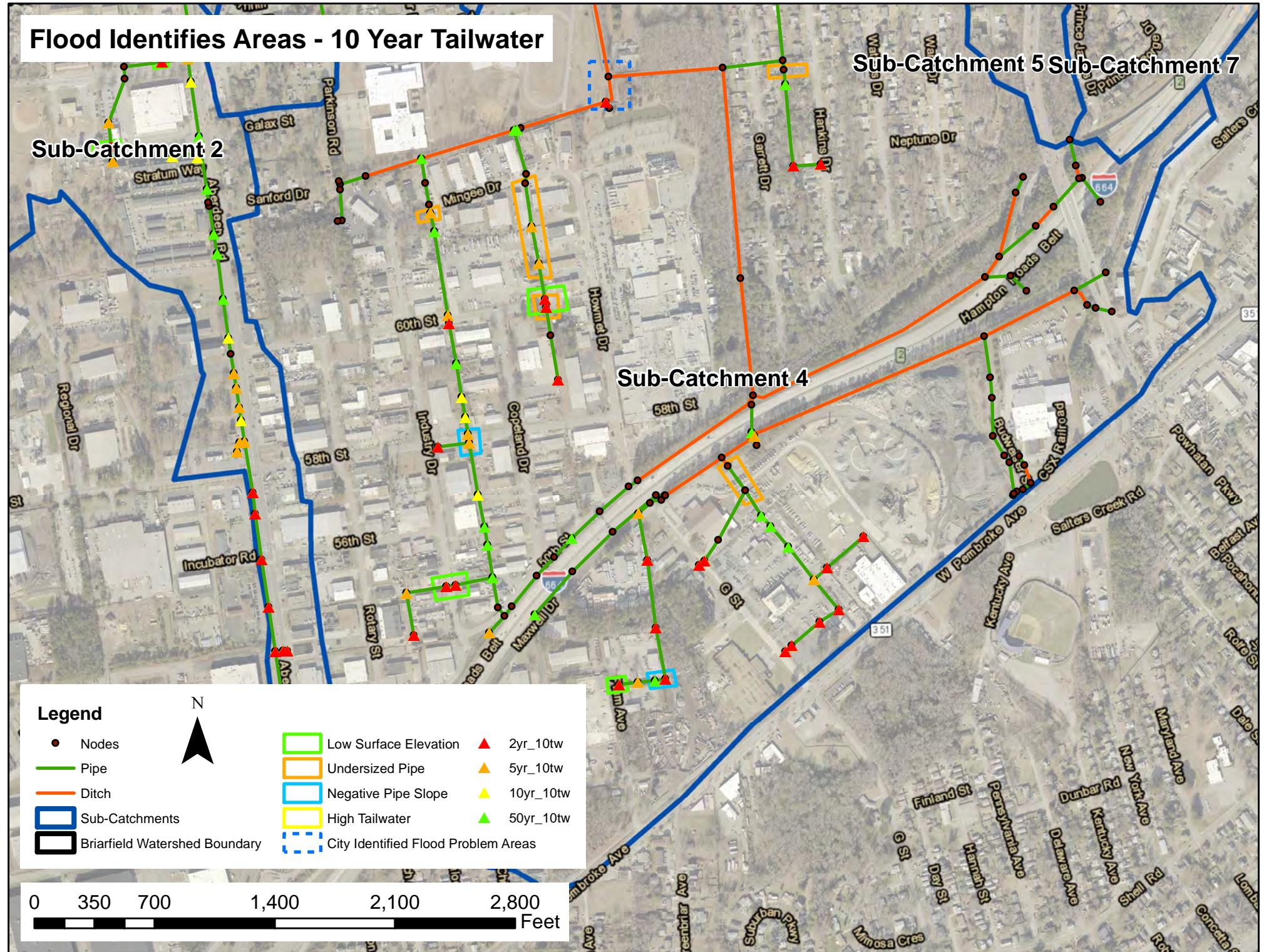
## Flood Identifies Areas - Monthly High Water



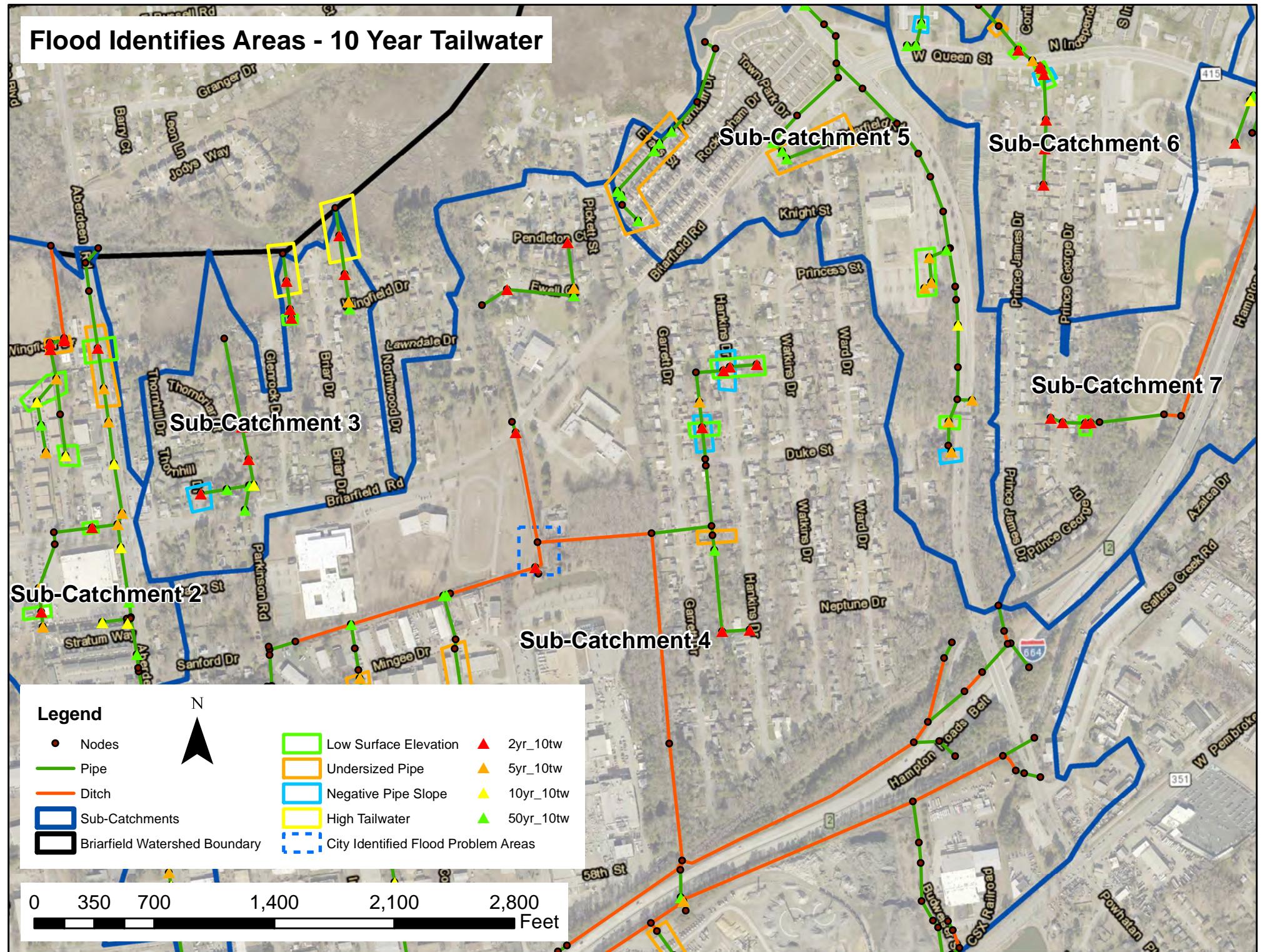
## Flood Identifies Areas - 10 Year Tailwater



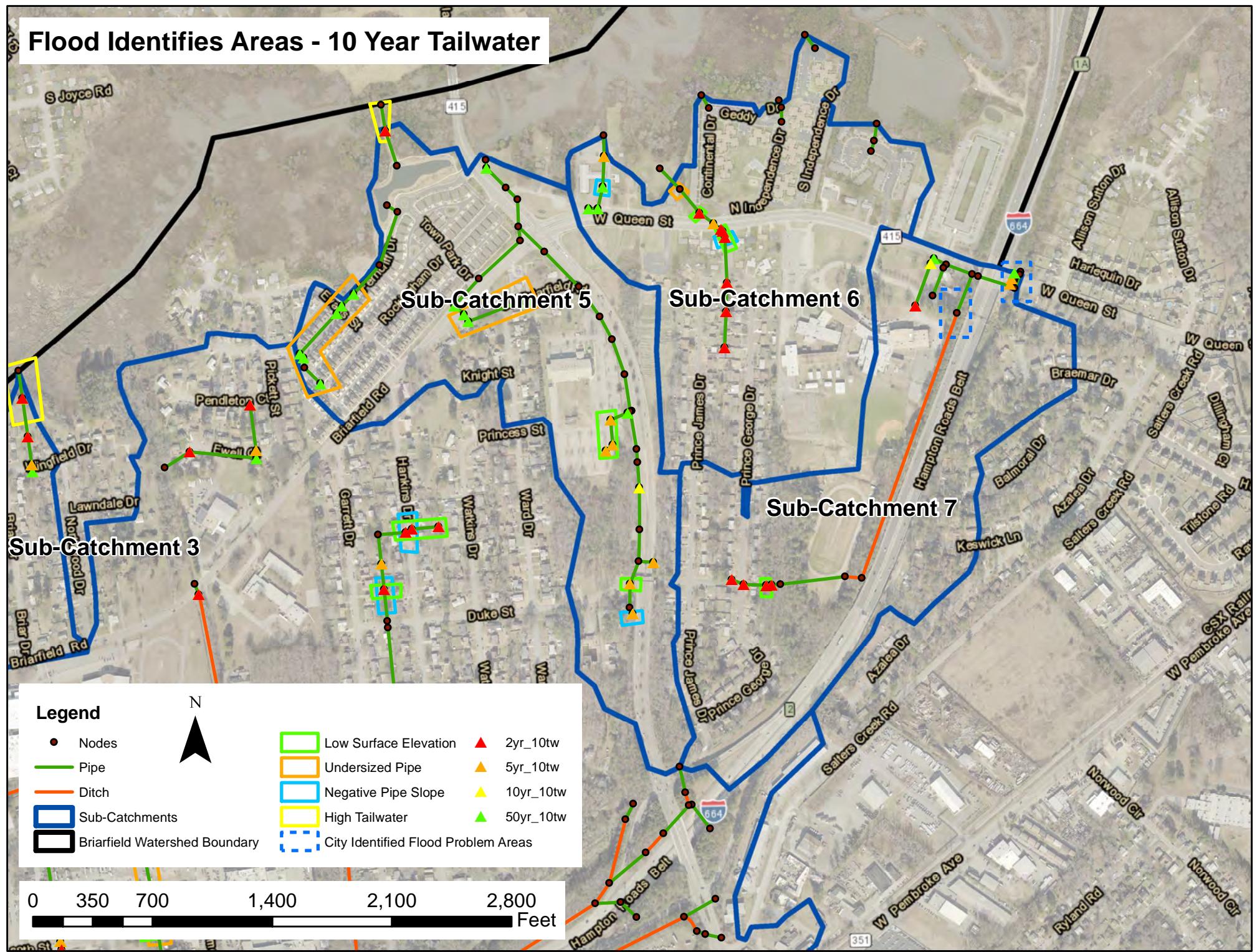
## Flood Identifies Areas - 10 Year Tailwater



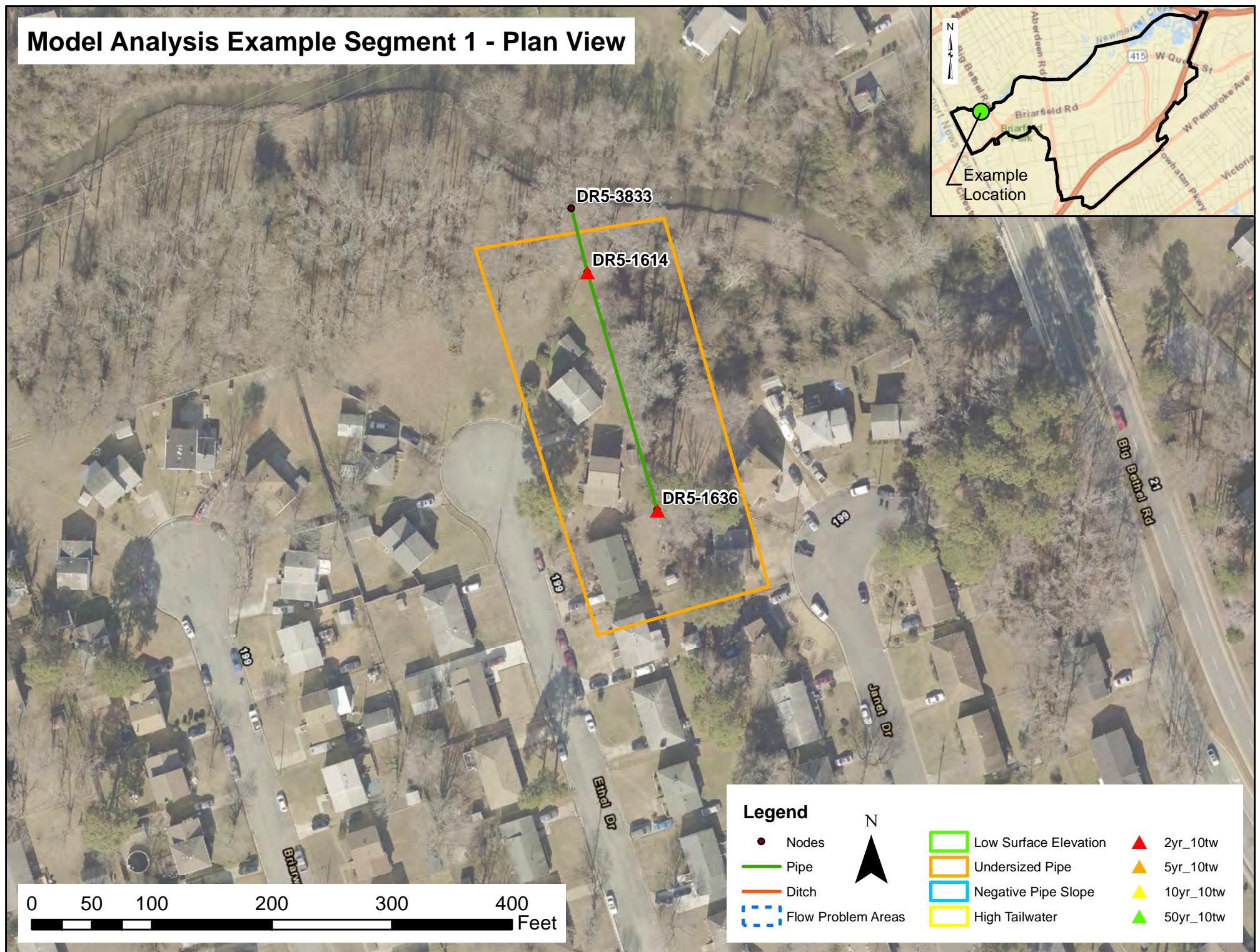
## Flood Identifies Areas - 10 Year Tailwater



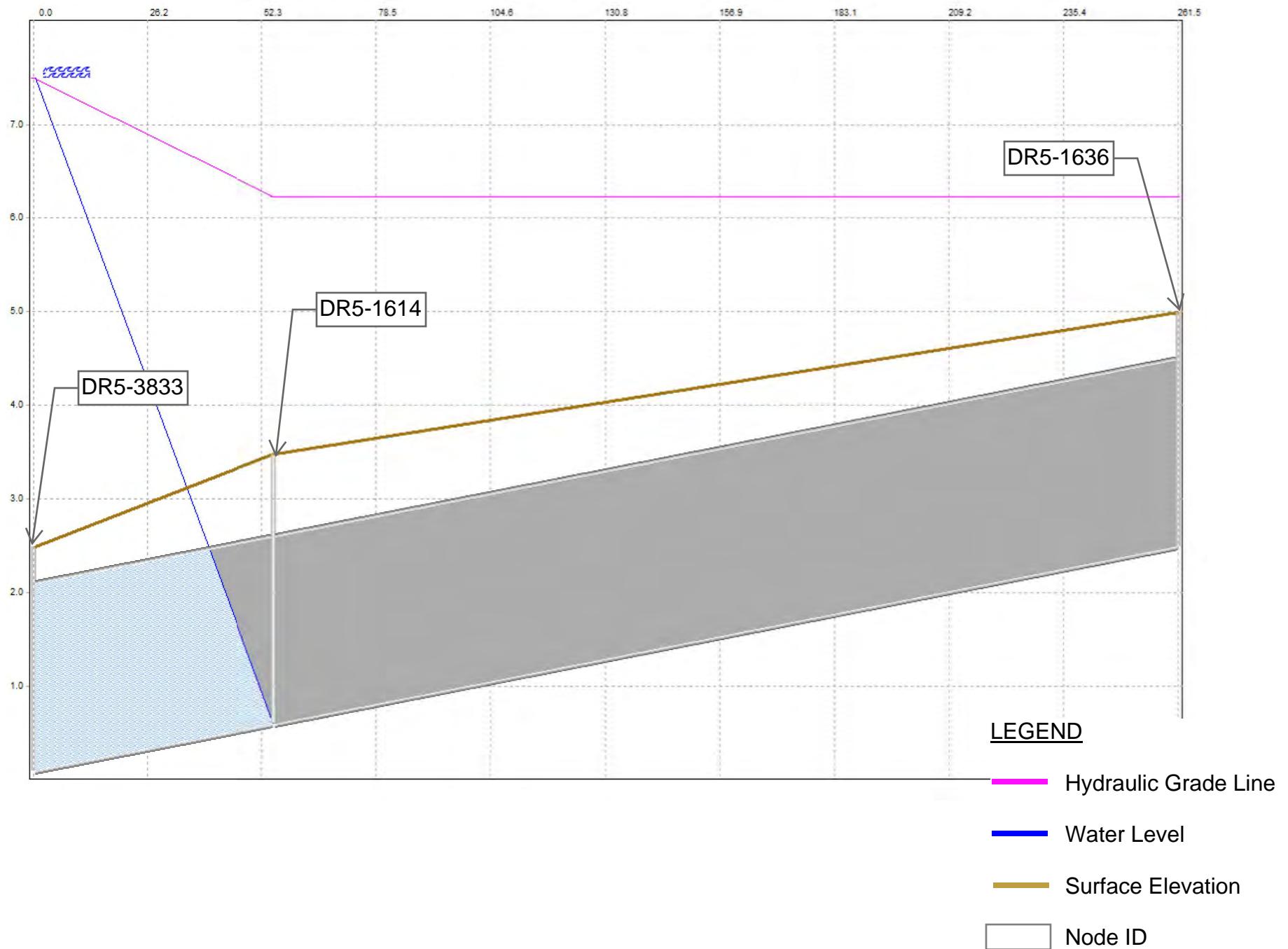
## Flood Identifies Areas - 10 Year Tailwater



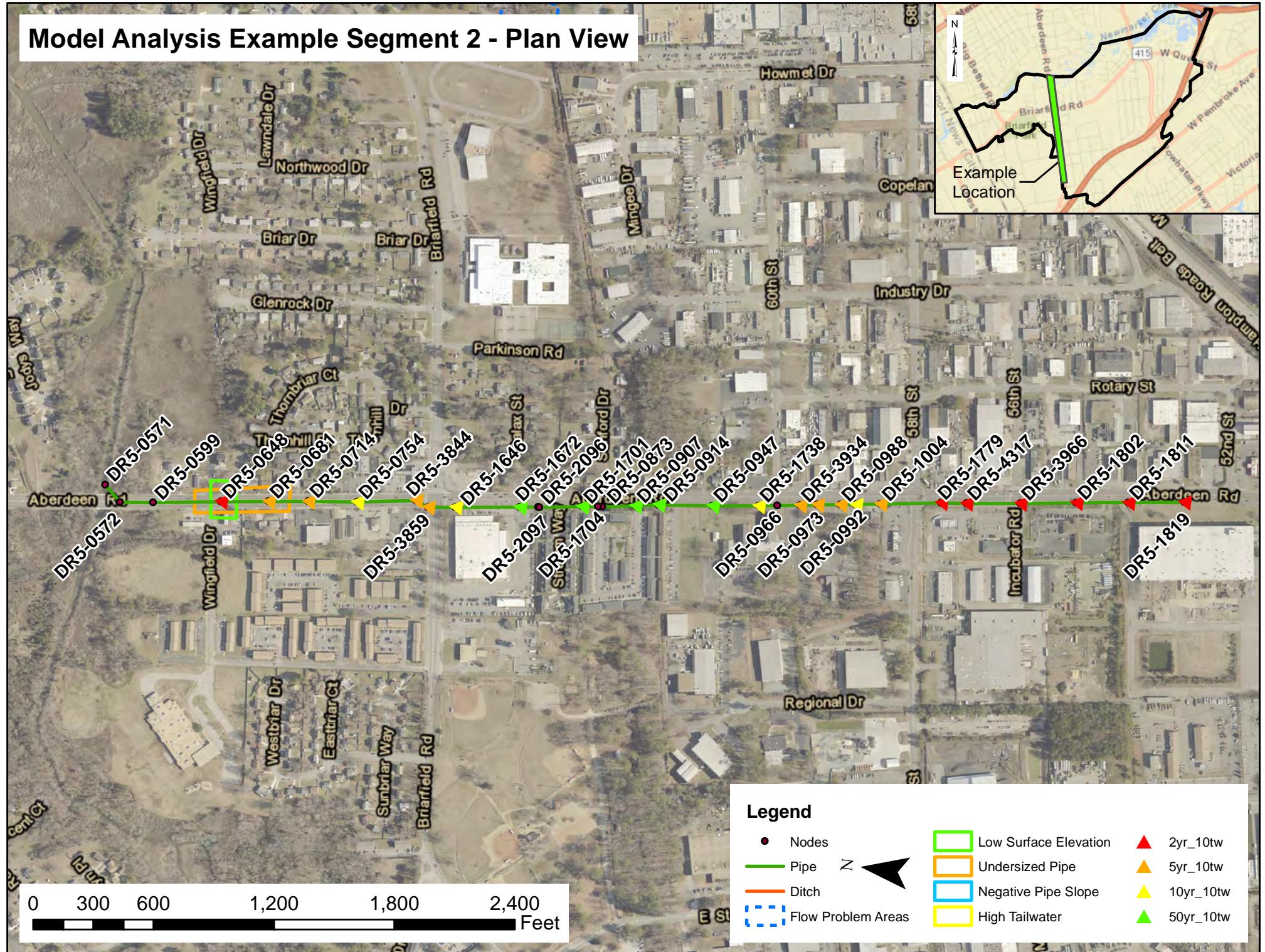
## Model Analysis Example Segment 1 - Plan View



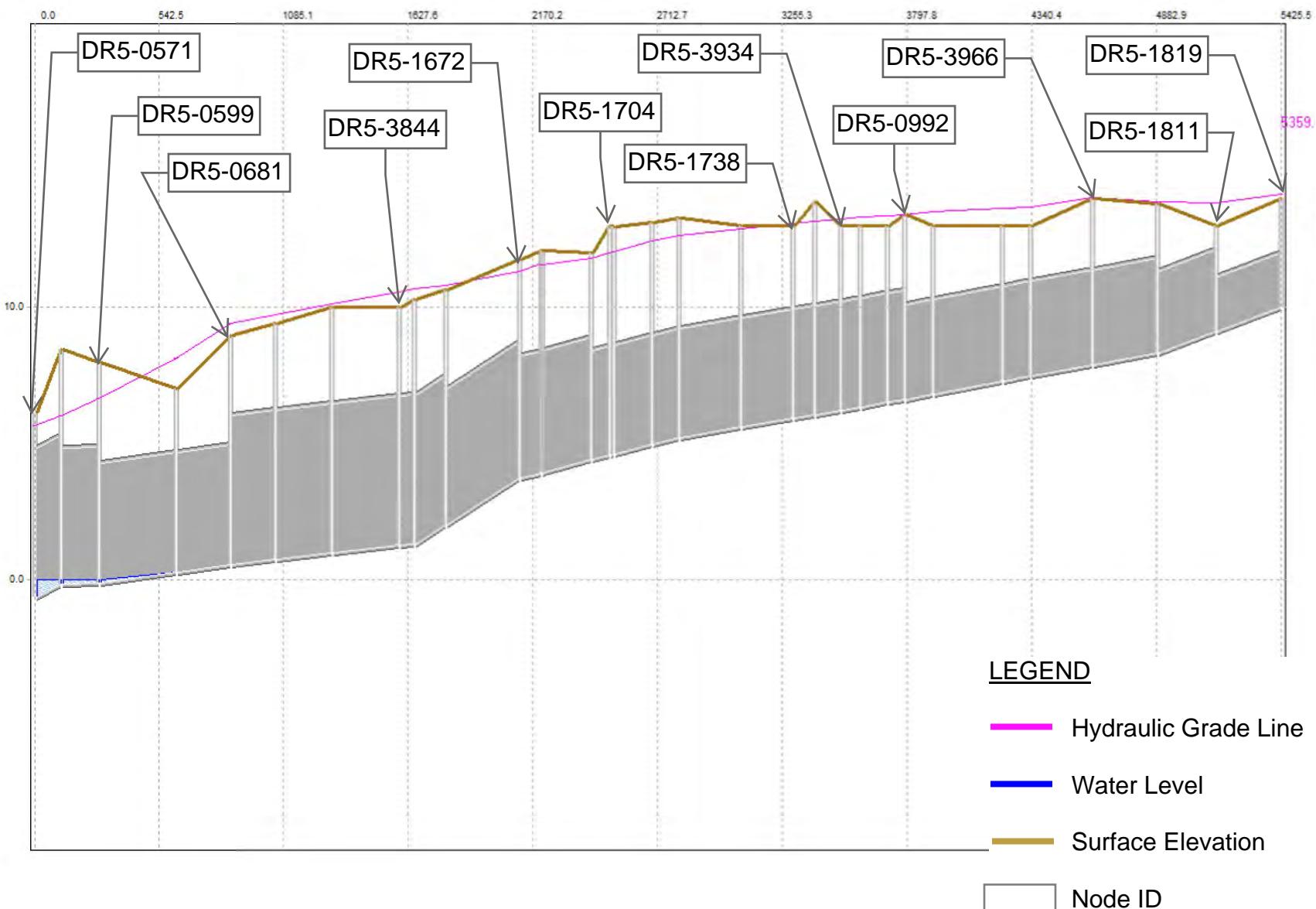
Model Analysis Example Segment 1 Profile - 10 year Storm with 10 year Tailwater Conditions  
Sub-Catchment 1, High Tailwater, Undersized Pipe



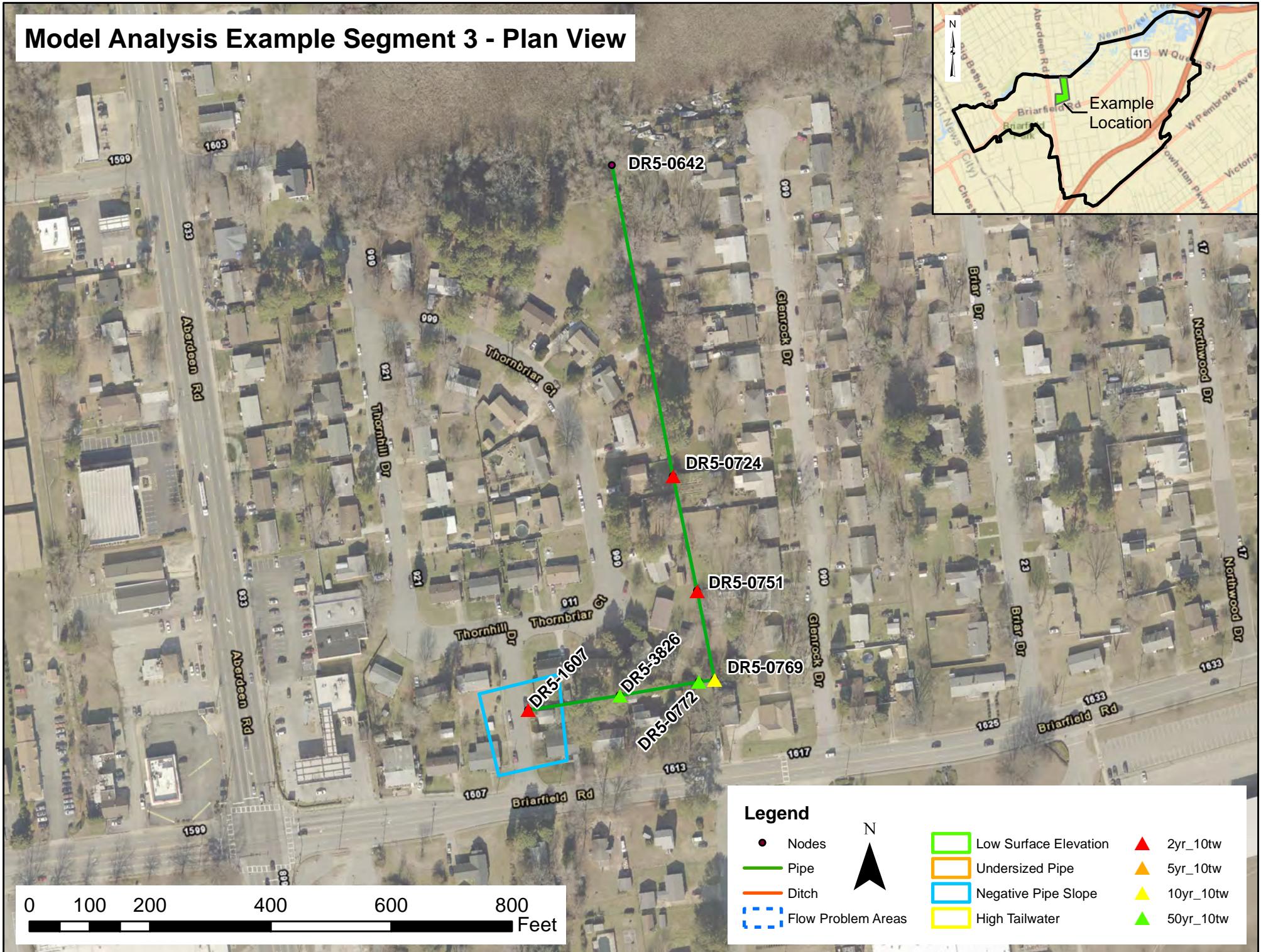
## Model Analysis Example Segment 2 - Plan View



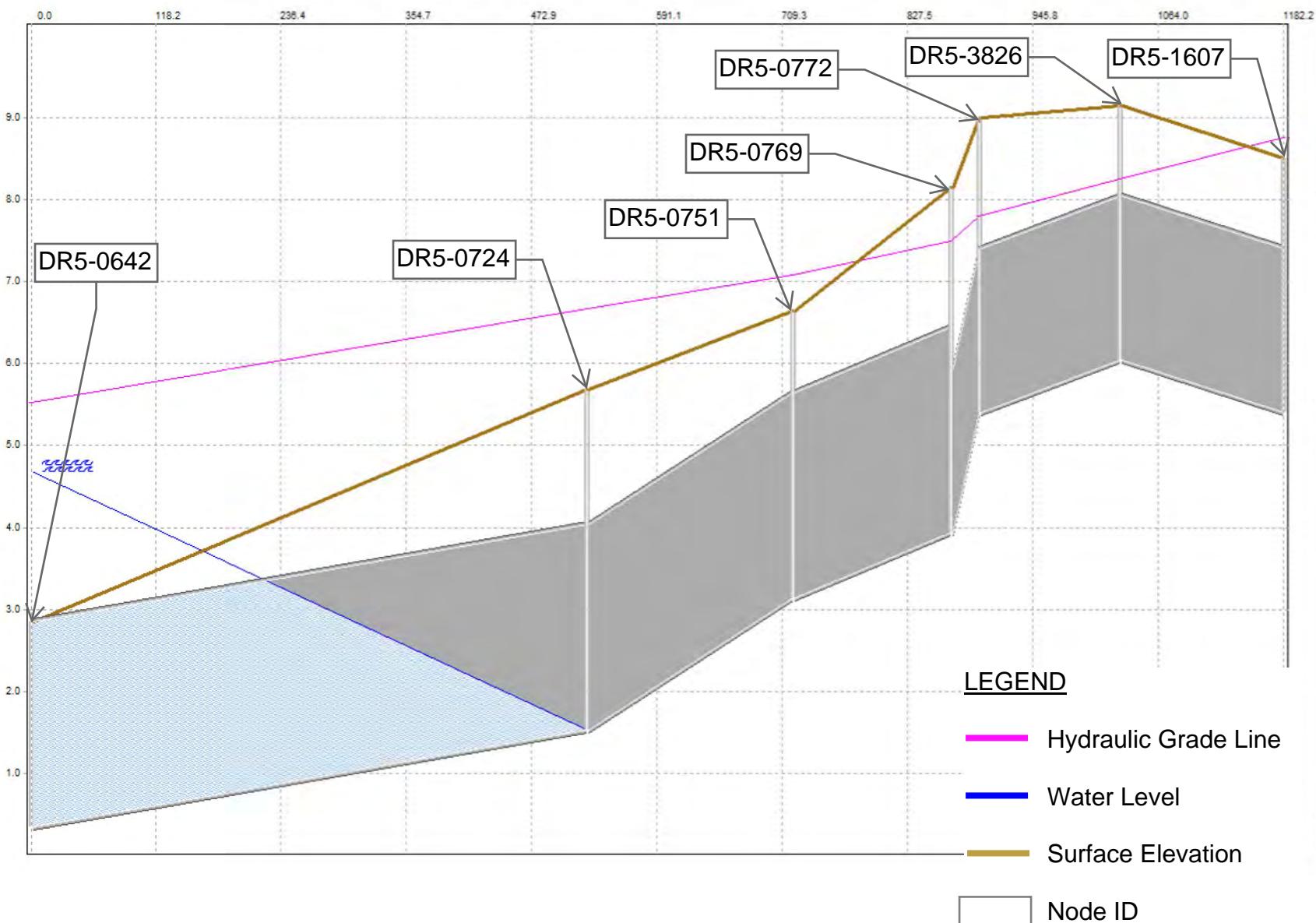
Model Analysis Example Segment 2 Profile - 10 year Storm with 10 year Tailwater Conditions  
 Sub-Catchment 2, Undersized Pipes, Low Surface Elevation



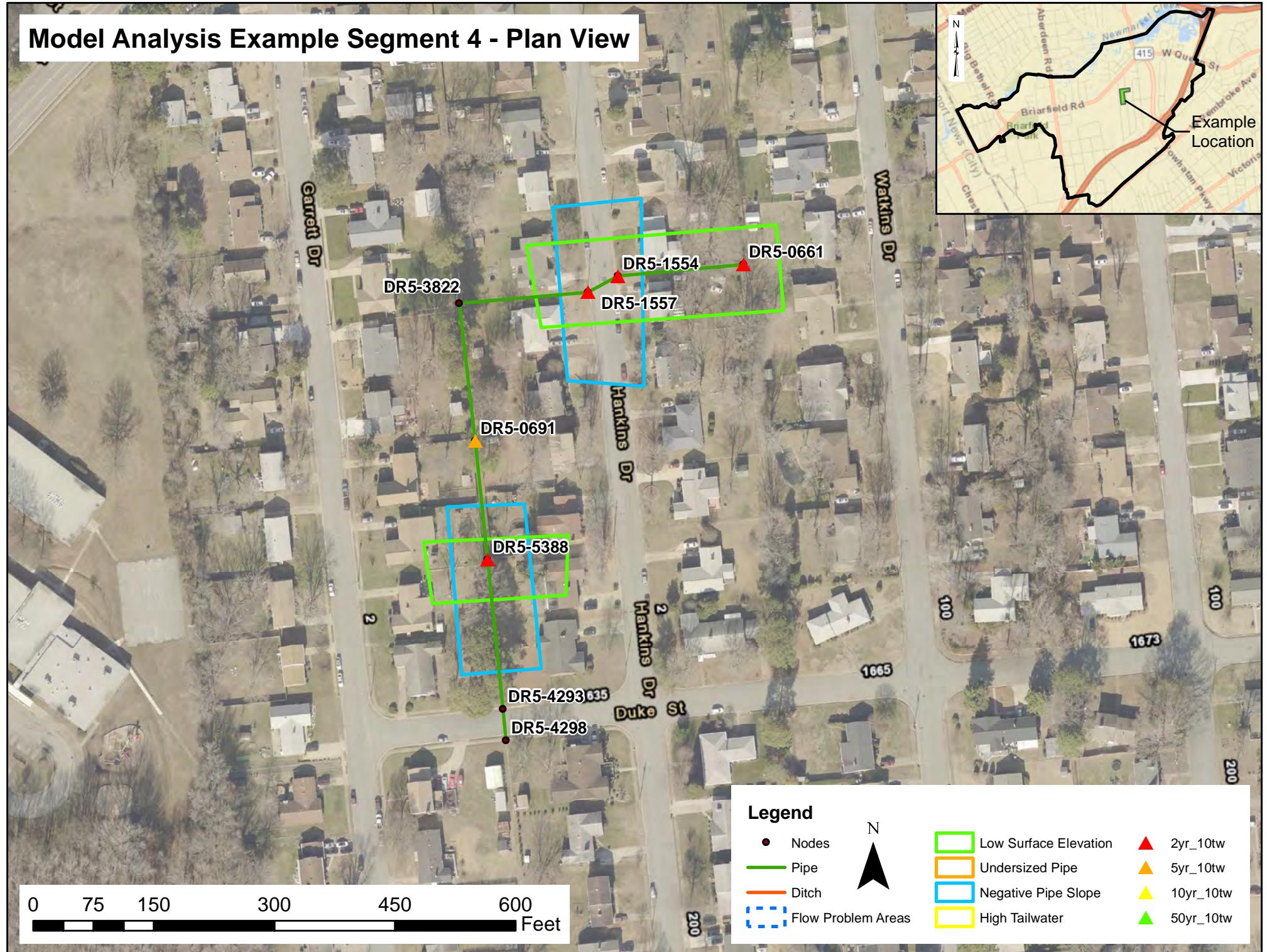
## Model Analysis Example Segment 3 - Plan View



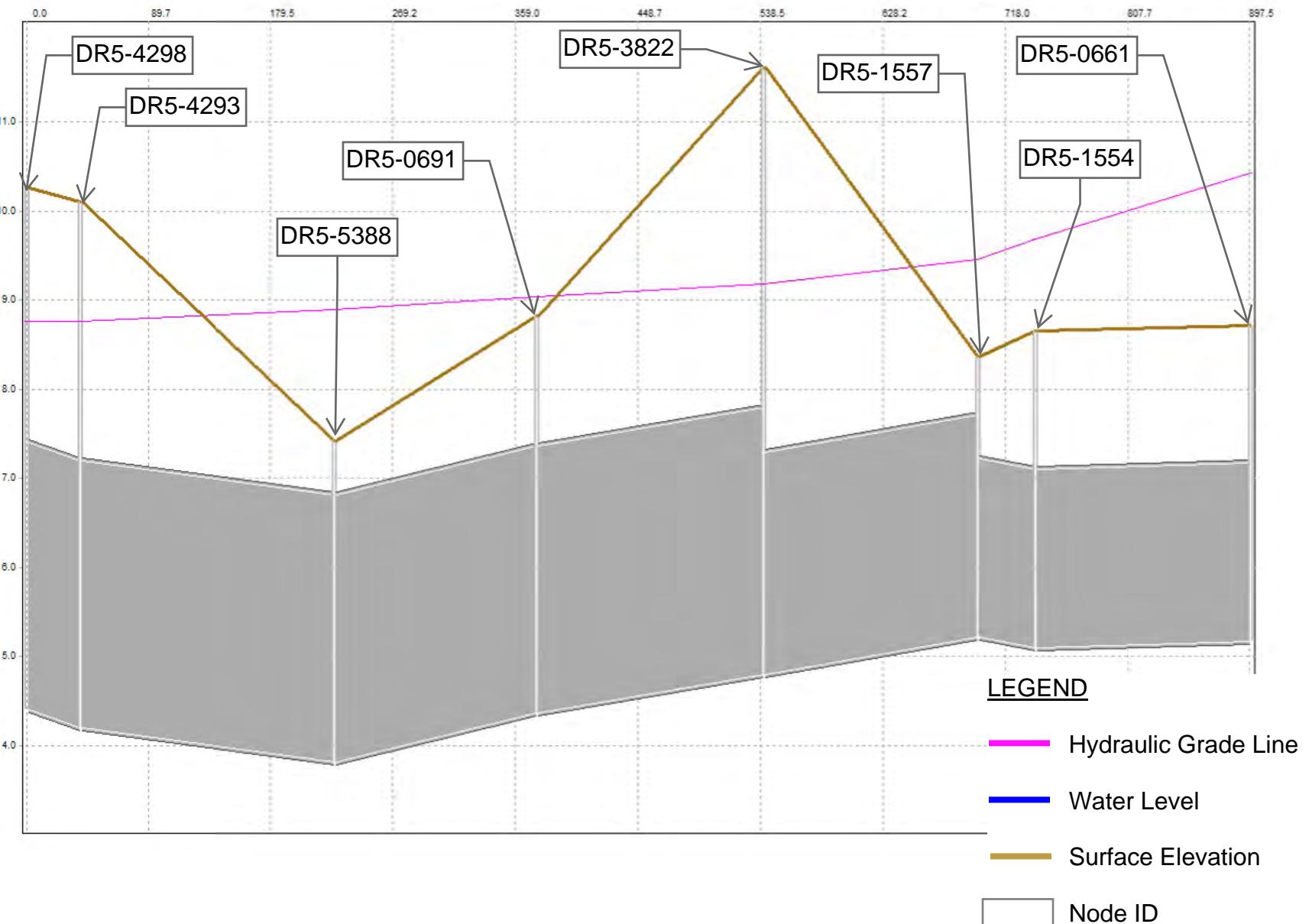
Model Analysis Example Segment 3 Profile - 10 year Storm with 10 year Tailwater Conditions  
 Sub-Catchment 3, Negative Pipe Slope



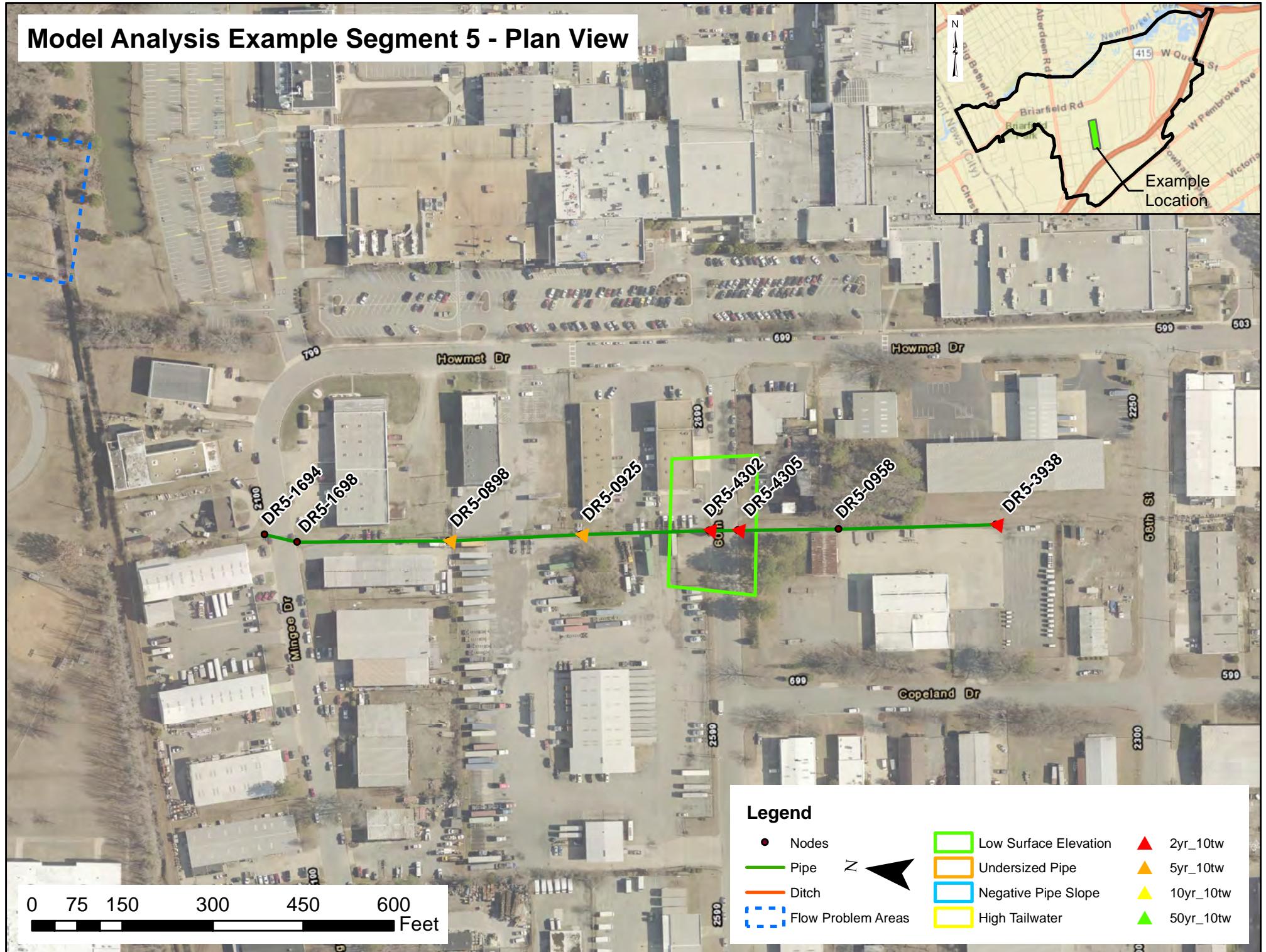
## Model Analysis Example Segment 4 - Plan View



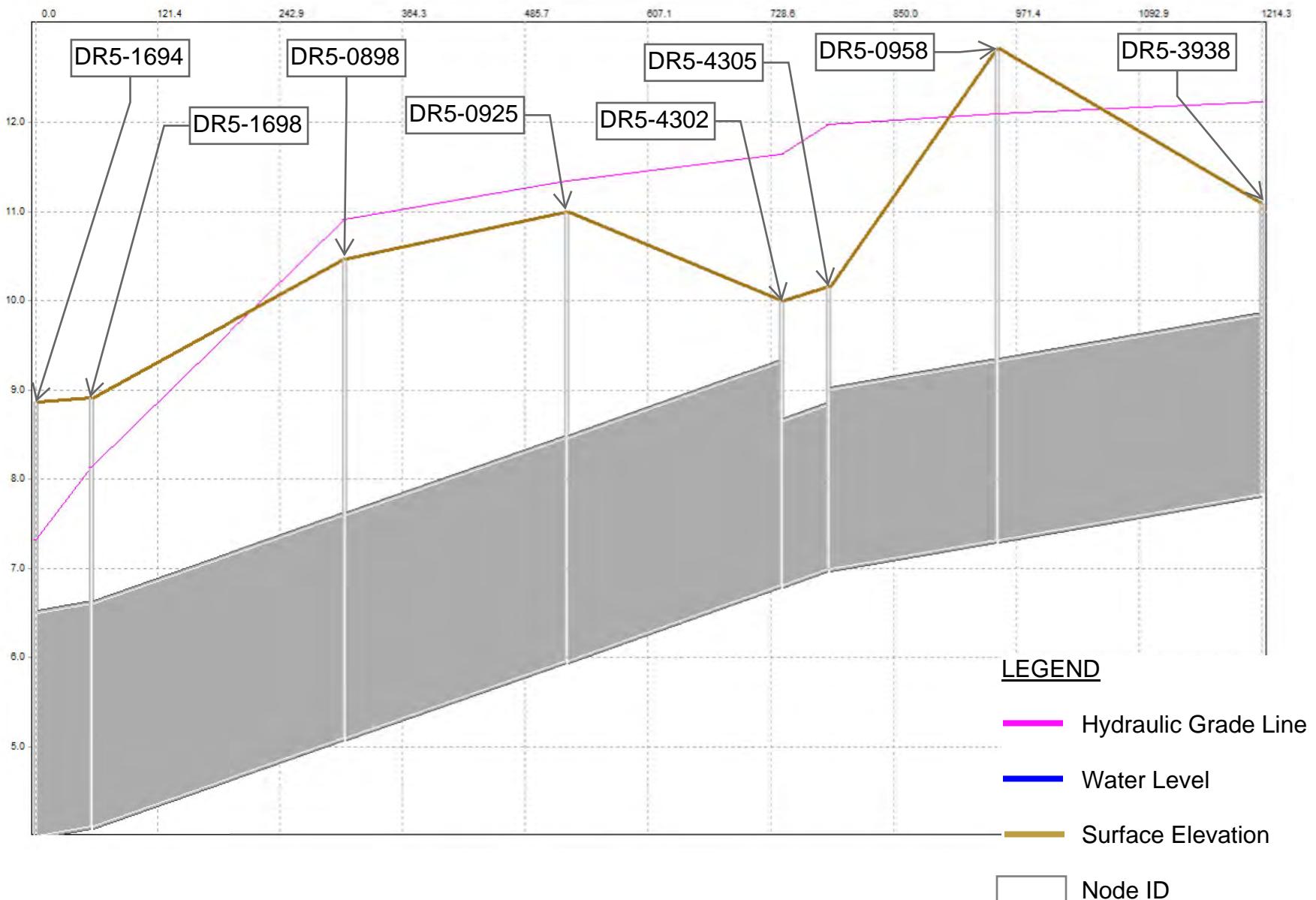
Model Analysis Example Segment 4 Profile - 10 year Storm with 10 year Tailwater Conditions  
Sub-Catchment 4, Negative Pipe Slope, Low Surface Elevation



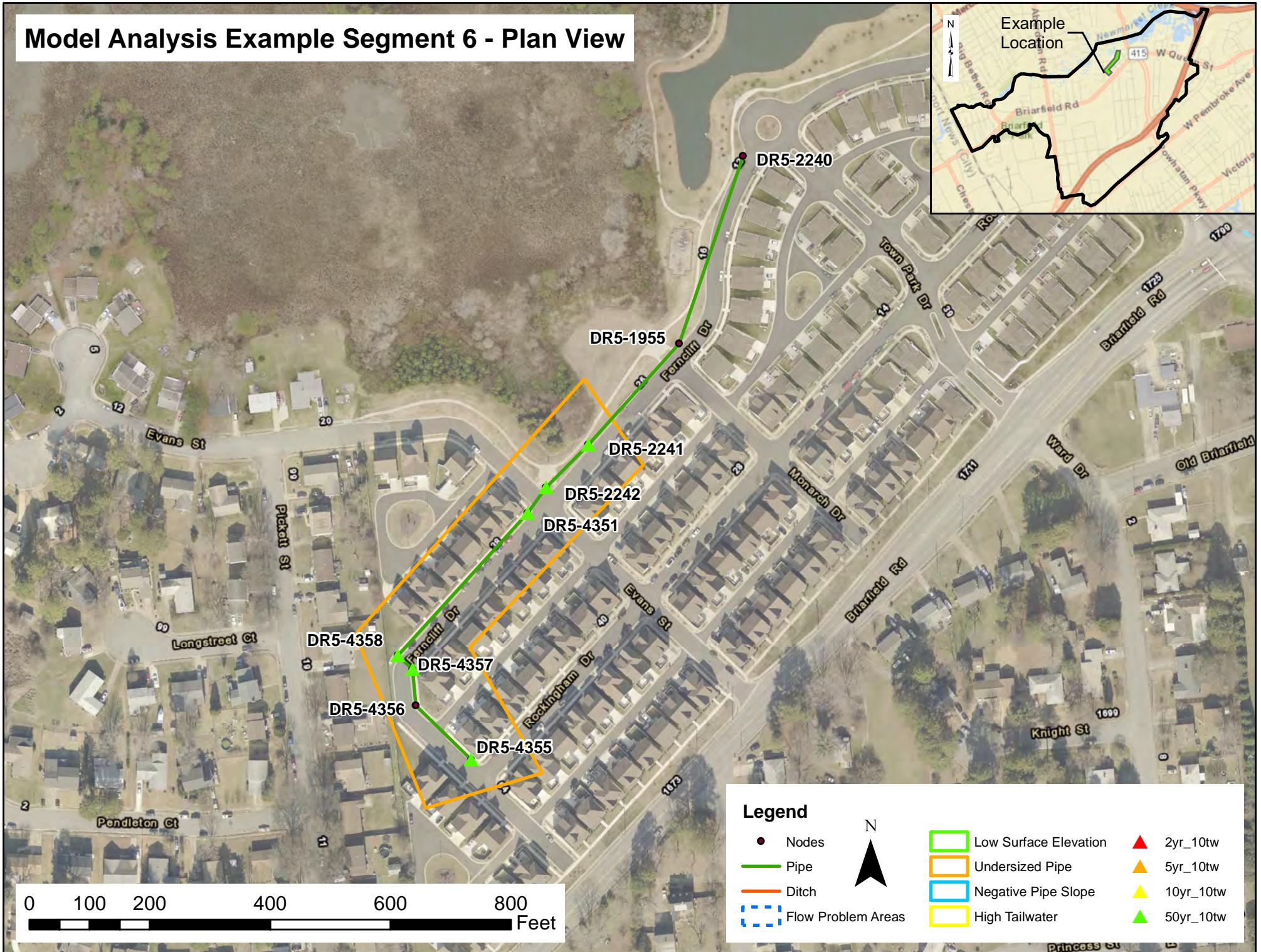
## Model Analysis Example Segment 5 - Plan View



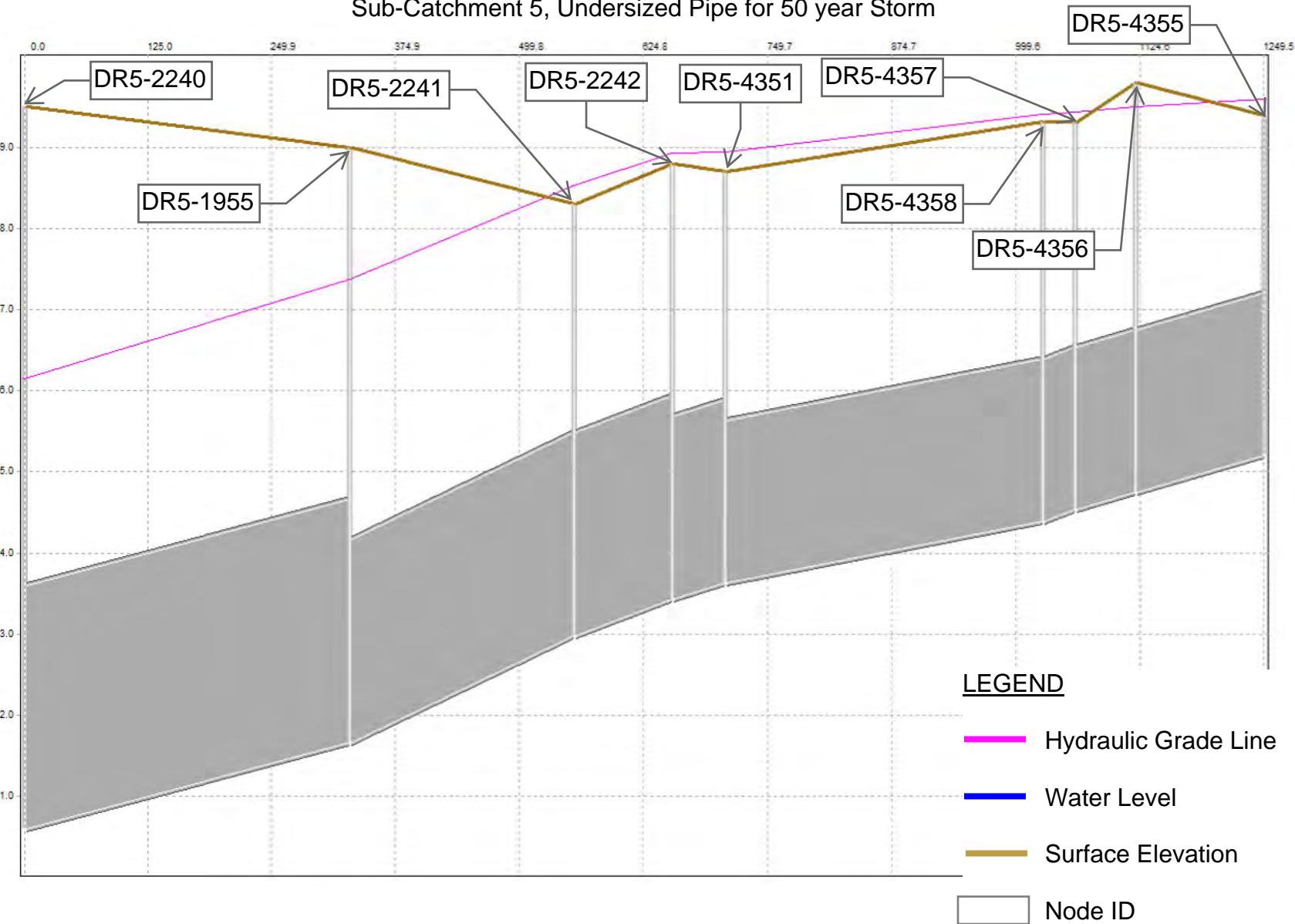
Model Analysis Example Segment 5 Profile - 10 year Storm with 10 year Tailwater Conditions  
Sub-Catchment 4, Undersized Pipe, Low Surface Elevation



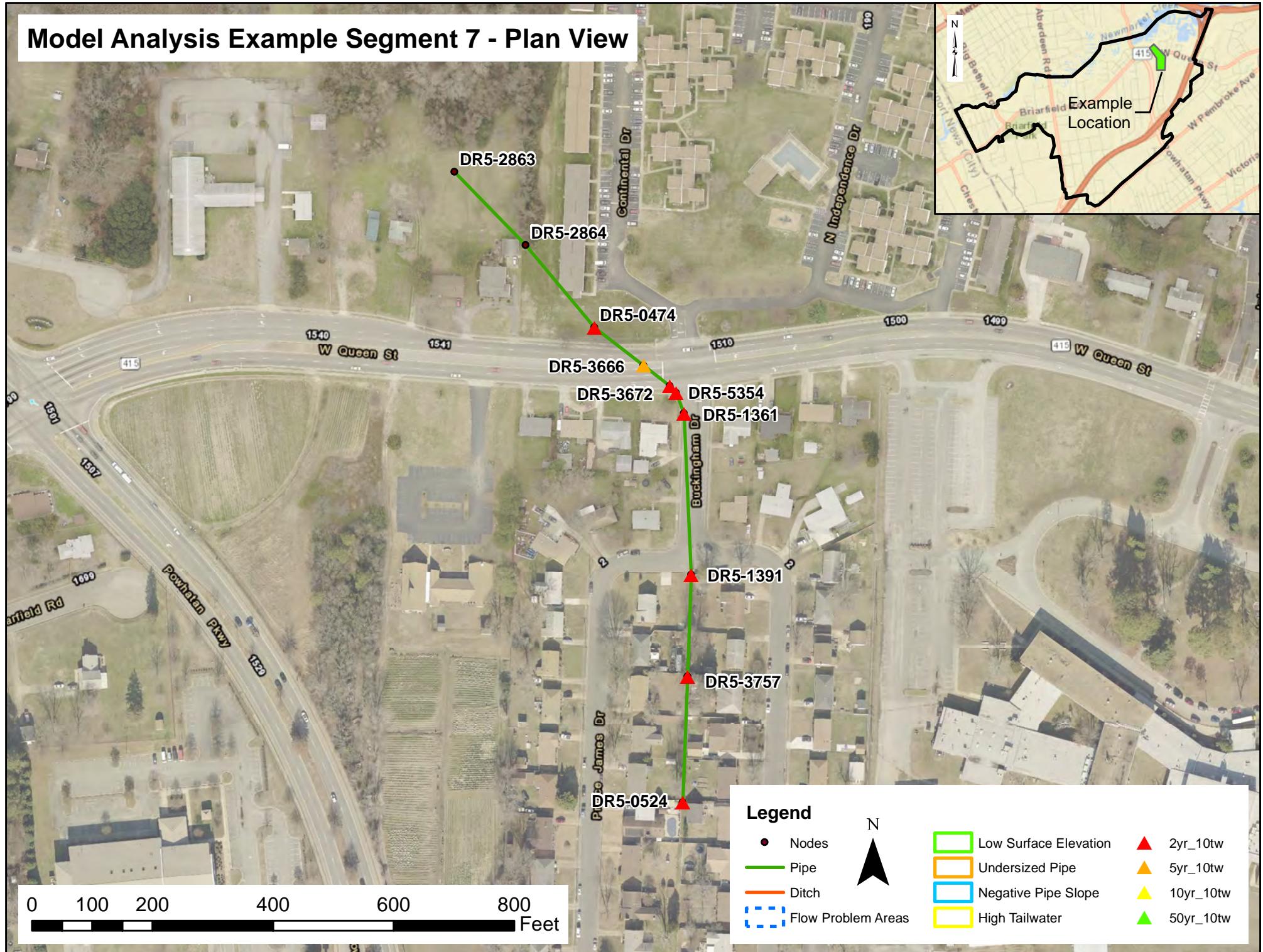
## Model Analysis Example Segment 6 - Plan View



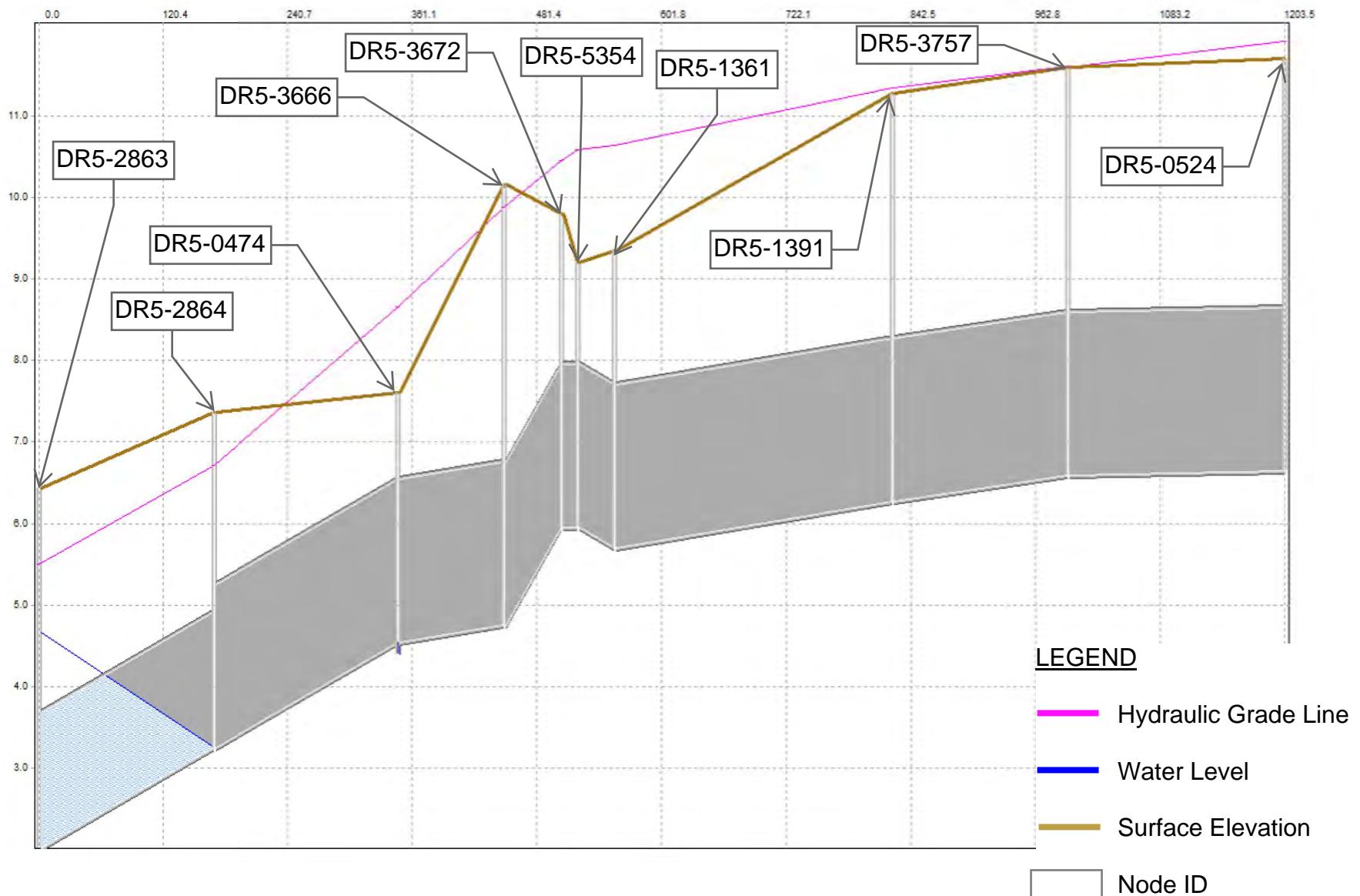
Model Analysis Example Segment 6 Profile - 50 year Storm with 10 year Tailwater Conditions  
Sub-Catchment 5, Undersized Pipe for 50 year Storm



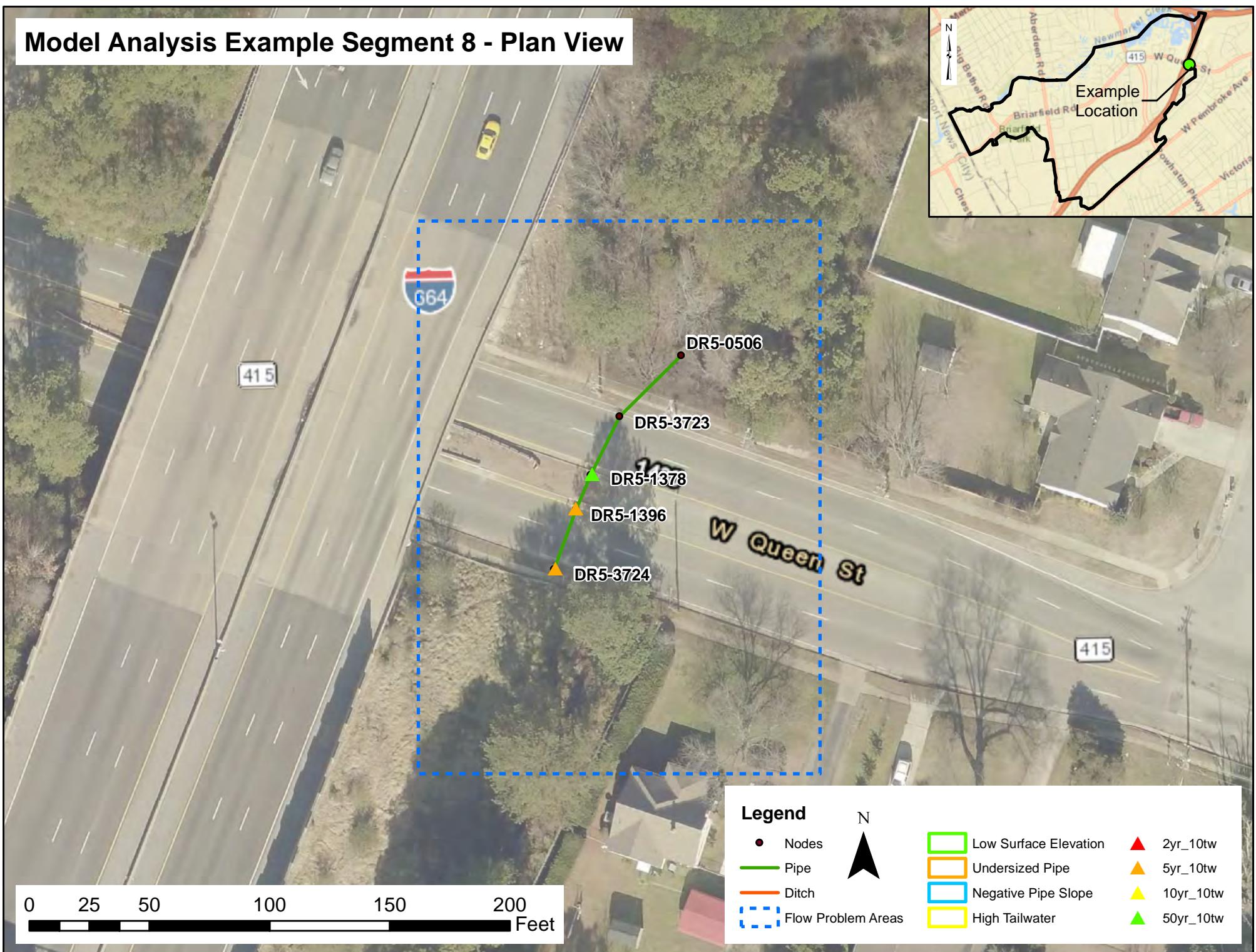
## Model Analysis Example Segment 7 - Plan View



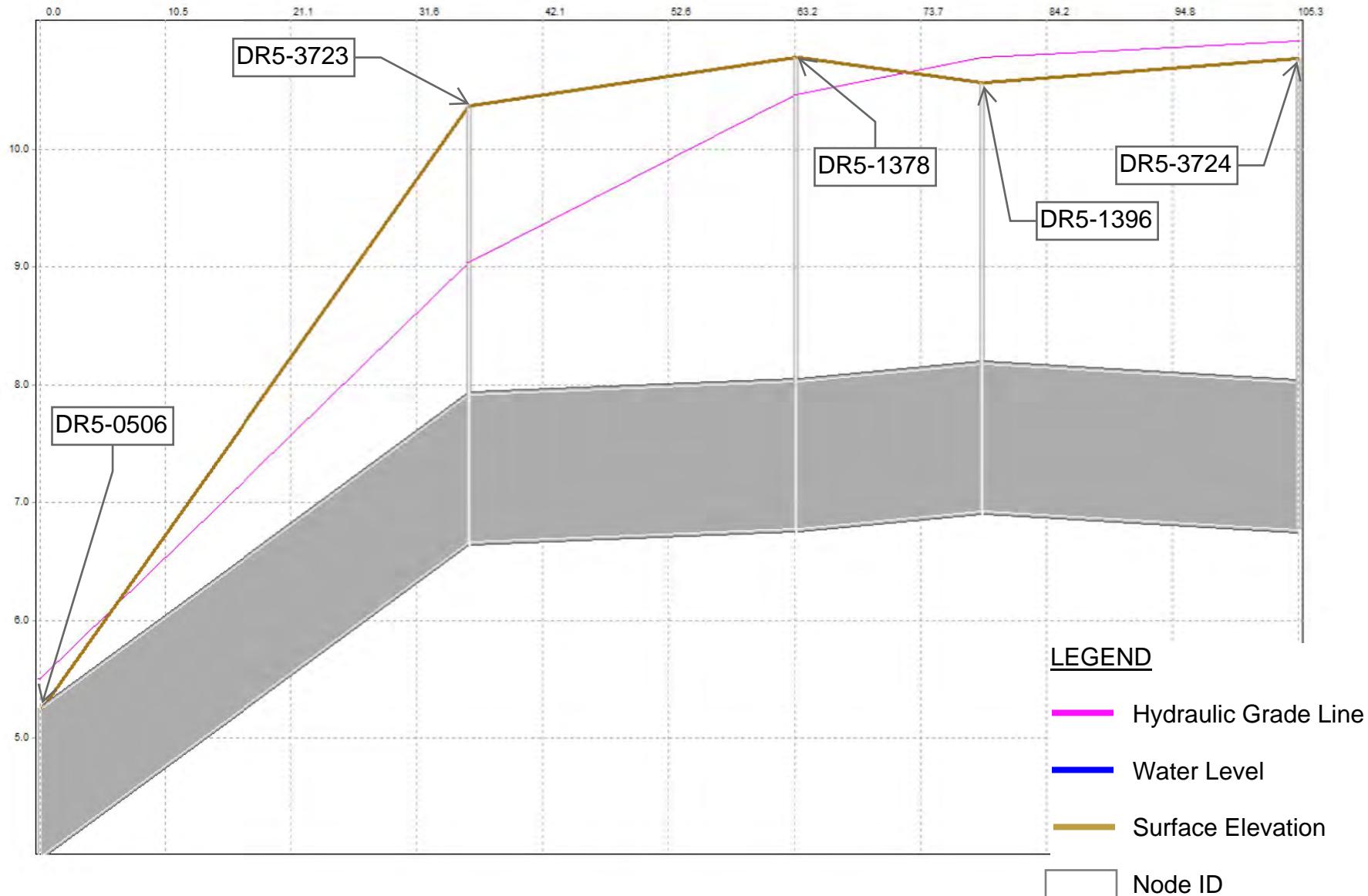
Model Analysis Example Segment 7 Profile - 2 year Storm with 10 year Tailwater Conditions  
 Sub-Catchment 6, Negative Pipe Slope, Undersized Pipe, Low Surface Elevation



## Model Analysis Example Segment 8 - Plan View



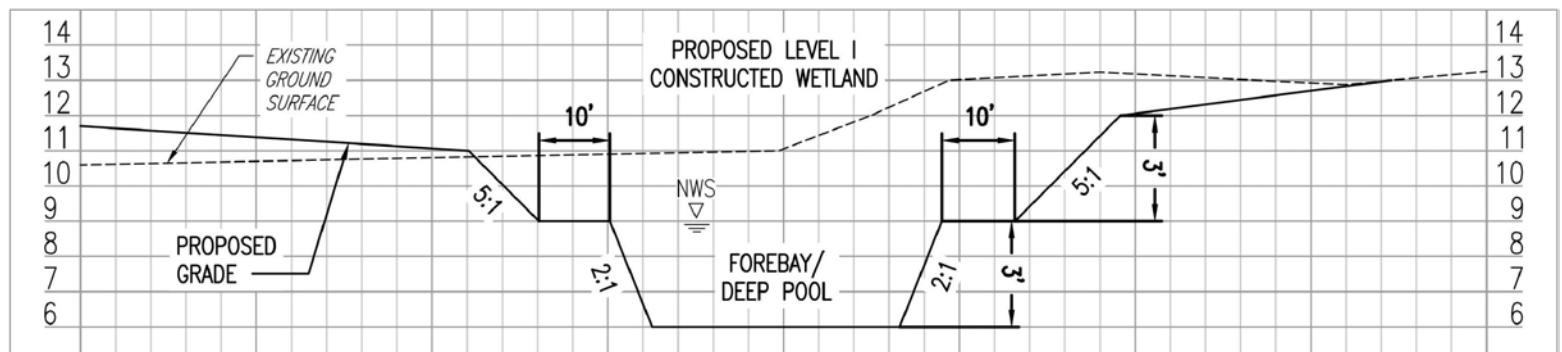
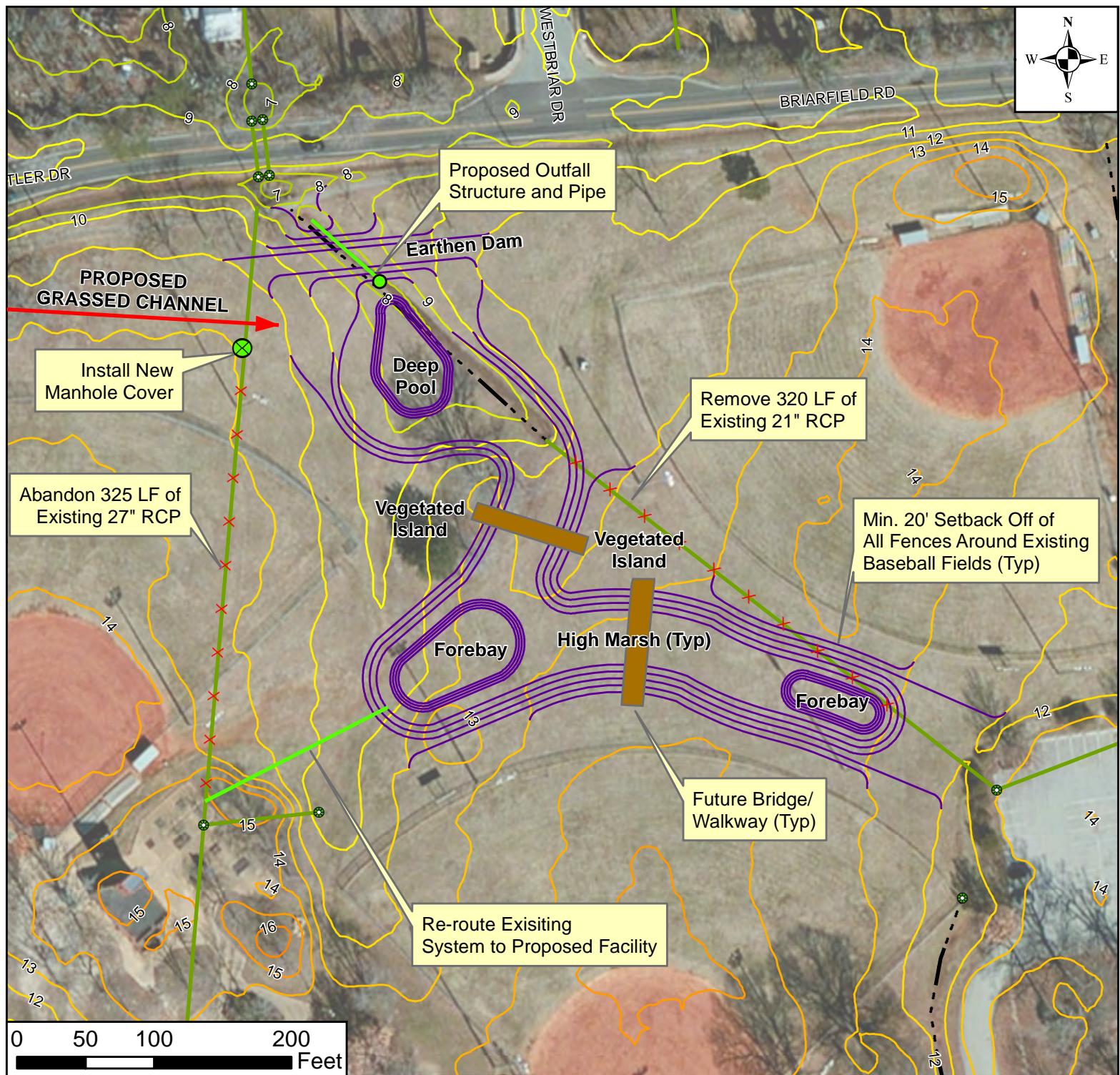
Model Analysis Example Segment 8 Profile - 10 year Storm with 10 year Tailwater Conditions  
Sub-Catchment 7, City of Hampton Identified Flood Area



## **Appendix C Proposed Project Improvement Maps and Descriptions**

### **Appendix Includes:**

- Proposed Project Locations A - J
  - Plan & Profile Figure
  - Project Write-up
  - Cost Estimate
  - Virginia Runoff Reduction Spreadsheet



Typical Cross-Section - N.T.S.

**Location A: Briarfield Park Level I Constructed Wetland**

## **Location A: Briarfield Park**

### **Existing Conditions**

Briarfield Park is located along Briarfield Road and E Street within the Briarfield Watershed in Hampton, Va. The Park shares a 41 acre (14.5% impervious) City of Hampton owned parcel with the Hampton Fire Department Station 9. The park includes 4 baseball fields, several parking lots and restroom/concession facilities. There are currently no stormwater quantity/quality control measures on site. However there are conveyance systems such as roadside ditches and an existing storm pipe system. The majority of the roadside ditches discharge into a stormwater collection system within Butler Drive and Fire Station 9 has its own storm pipe system. Drainage for the remainder 25 acres (17% impervious), is directed to two (2) 24" pipes which cross under Briarfield Road, then through a single 30" pipe ultimately discharging into a low-lying wetland west of Westbriar Drive. The homes located along this wetland, downstream of the parks existing drainage system, currently experience flooding during larger storm events. This project area is not located within a Chesapeake Bay Resource Protection Area or Management Area. This property is located within an AE flood hazard zone; additionally there is a 0.2 percent annual chance of flood hazard for part of the park. There are no known or visible archeological sites, historical sites or other similar cultural resources located on this site. According to the National wetland Inventory mapping there were no wetlands on the site.

### **Proposed Work**

The proposed project consists of installing a Level I Constructed Wetland on the northern portion of the site to treat runoff from the park and surrounding area. The proposed facility will treat approximately 21.79 acres (16% impervious), achieving a Phosphorus removal credit of 8.99 lbs P/year. Additionally this facility is anticipated to address some of the downstream inundation experienced during heavy storm events. The new stormwater facility will outfall to the existing twin 24" culverts crossing under Briarfield Road. Total project costs are \$356,000 and the cost per pound of phosphorus removal is estimated to be \$39,600.

Work associated with constructing the proposed facility includes installing an earthen berm and engineered outfall structure to help contain and control the water level within the proposed wetland. The abandonment of approximately 325 linear feet of existing storm sewer, the removal of approximately 320 linear feet of existing storm sewer and diverting the associated flows to the proposed facility. Additionally bridges/walkways are proposed to help maintain access to all areas of the park.

The NRCS soils survey shows soils within the proposed project area are a composition of Altavista-Urban Land Complex, Augusta-Urban Land Complex and Tomotley-Urban Land Complex. A preliminary soils investigation in the area of the proposed work confirmed the findings of the NRCS soil survey and showed that the soils were suitable for constructing a wetland treatment cell.

### **Limitations**

1. The stormwater facility is to be setback 20' off of the existing baseball field's fences.
2. A portion of the existing sidewalk along Briarfield Road may need to be relocated to accommodate the new stormwater features.
3. The installation of pedestrian bridges across the facility may be required to ensure adequate ingress egress across the site.
4. A significant amount of excess excavated soils will have to be hauled offsite.
5. To avoid excessive dewatering, work needs to be completed in a low water table time of year.

## **Items of Interest**

Additional credits and positive outcomes for this project include items 1-3 below. A detailed model of the stormwater system will be developed during the design phase of the project and these additional benefits will be considered at that time.

1. The proposed stormwater facility may achieve an additional 4.49 lbs of removal if a level 2 facility can be constructed.
2. The proposed facility may reduce some local ponding downstream.
3. The proposed stormwater facility may yield additional POC removal credits in the future where:
  - a. An additional 3.19 acres (23.7% impervious) can be gained by re-directing the existing roadside ditches to the proposed facility. This may increase Phosphorus removals by as much as 1.51 lb P/year.
  - b. The park currently has acreage on the south side of the property which has the potential for development. If the 10.78 forested acres were developed to 50% impervious cover, Phosphorus removals for this development are estimated to be 8.6 lbs P/year.

## **Location A Project Summary**

1. Site Description: Briarfield Park
2. Proposed Facility: Level I Constructed Wetland
3. Latitude: 37.017699°
4. Longitude: -76.408197°
5. Total Drainage Area: 21.79 acres
6. % Impervious: 16.0%
7. Total Nitrogen Removal: 32.15 lb N/year
8. Total Phosphorus Removal: 8.99 lb P/year
9. Total Suspended Solids Removal: 2,959.00 lb SS/year
10. Total Cost: \$356,000
11. Cost per lb P: \$39,600/lb P

Briarfield Watershed Study				
Location 'A' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 23,339	1.00	LS	\$ 23,339.38
<b>Site Preparation</b>				
Demolition of Existing Outfall	\$ 3,500	1.00	EA	\$ 3,500
Remove 21" RCP	\$ 25	320.00	EA	\$ 8,000
Abandon 27" RCP	\$ 2,500	1.00	EA	\$ 2,500
<b>Earthwork</b>				
Excavation and dispose offsite	\$ 20	5300.00	CY	\$ 106,000
Topsoil (strip, stockpile, regrade)	\$ 5,000	3.00	AC	\$ 15,000
Shaping and Fine Grading	\$ 5,000	3.00	AC	\$ 15,000
Wetlands Plants & Landscaping	\$ 12,000	1.00	LS	\$ 12,000
<b>Structures</b>				
Outfall Structure & Piping	\$ 4,500	1.00	EA	\$ 4,500
End Section	\$ 750	3.00	EA	\$ 2,250
27" RCP	\$ 60	150.00	LF	\$ 9,000
VDOT DI-1	\$ 3,500	1.00	EA	\$ 3,500
Class A1 RR	\$ 55	20.00	TN	\$ 1,100
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	1.00	EA	\$ 3,000
Temporary Silt Fence	\$ 3	2100.00	LF	\$ 6,300
Tree Protection	\$ 5	200.00	LF	\$ 1,000
Dewatering	\$ 5,000	1.00	LS	\$ 5,000
Outfall Protection/Temp Check dam	\$ 2,250	6.00	EA	\$ 13,500
Traffic Control	\$ 4,500	1.00	EA	\$ 4,500
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	3.00	AC	\$ 3,000
Fertilizer	\$ 500	2.00	LS	\$ 1,000
General Stabilization seed mix	\$ 3,500	2.25	AC	\$ 7,875
<b>Additional Items</b>				
Fabricated Foot Bridges	\$ 8,500	2.00	EA	\$ 17,000
<b>Subtotal Materials</b>				<b>\$ 244,525</b>
<b>SUBTOTAL= subtotal materials plus mobilization</b>				<b>\$ 267,864</b>
Design Fee				\$ 61,609
10% Contingency				\$ 26,786
<b>Construction (2016 \$)</b>				<b>\$ 356,000</b>
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				

Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014					
To be used w/ 2011 BMP Standards and Specifications					
Site Data					
Project Name: Briarfield Watershed Study - Location A - Briarfield Park					
Date: February 2016					
<b>1. Post-Development Project &amp; Land Cover Information</b>					
<b>Constants</b>					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26			Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				
<b>Land Cover (acres)</b>					
<b>A soils</b>		<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	<b>Totals</b>
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	18.30	18.30
Impervious Cover (acres)	0.00	0.00	0.00	3.49	3.49
				Total	21.79
<b>Rv Coefficients</b>					
<b>A soils</b>		<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
<b>Land Cover Summary</b>					
Forest/Open Space Cover (acres)	0.00				
Weighted Rv(forest)	0.00				
% Forest	0%				
Managed Turf Cover (acres)	18.30				
Weighted Rv(turf)	0.25				
% Managed Turf	84%				
Impervious Cover (acres)	3.49				
Rv(imperVIOUS)	0.95				
% ImperVIOUS	16%				
<b>Total Site Area (acres)</b>	21.79				
<b>Site Rv</b>	0.36				
Post-Development Treatment Volume (acre-ft)	0.66				
Post-Development Treatment Volume (cubic feet)	28,643				
Post_Development Load (TP) (lb/yr)	18.00	Post_Development Load (TN) (lb/yr)			128.74
Total Load (TP) Reduction Required (lb/yr)	9.06				





Site Results		D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	3.49	0.00	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	3.49	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA	18.30	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA TREATED	18.30	0.00	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	OK.	
<b>Phosphorus</b>							
TOTAL TREATMENT VOLUME (cf)	28,643						
TOTAL PHOSPHORUS LOAD REDUCTION REQUIRED (LB/YEAR)	9.06						
RUNOFF REDUCTION (cf)	0						
PHOSPHORUS LOAD REDUCTION ACHIEVED (LB/YR)	8.99						
ADJUSTED POST-DEVELOPMENT PHOSPHORUS LOAD (TP) (lb/yr)	9.01						
REMAINING PHOSPHORUS LOAD REDUCTION (LB/YR) NEEDED	0.07						
<b>Nitrogen (for information purposes)</b>							
TOTAL TREATMENT VOLUME (cf)	28,643						
RUNOFF REDUCTION (cf)	0						
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	32.15						
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TN) (lb/yr)	96.59						

## Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

**Site Data Summary**

Total Rainfall = 43 inches

**Site Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	18.30	18.30	83.98
Impervious (acres)	0.00	0.00	0.00	3.49	3.49	16.02
					21.79	100.00

Site Rv	0.36
Post Development Treatment Volume (ft <sup>3</sup> )	28643
Post Development TP Load (lb/yr)	18.00
Post Development TN Load (lb/yr)	128.74
Total TP Load Reduction Required (lb/yr)	9.06

Total Runoff Volume Reduction (ft <sup>3</sup> )	0
Total TP Load Reduction Achieved (lb/yr)	9
Total TN Load Reduction Achieved (lb/yr)	32.15
Adjusted Post Development TP Load (lb/yr)	9.01
Remaining Phosphorous Load Reduction (lb/yr) Required	0.07

**Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	18.30	0.00	0.00	0.00	0.00	18.30
Impervious (acres)	3.49	0.00	0.00	0.00	0.00	3.49
						21.79

**Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	8.99	0.00	0.00	0.00	0.00	8.99
TN Load Red. (lb/yr)	32.15	0.00	0.00	0.00	0.00	32.15

**Drainage Area A Summary****Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	18.30	18.30	83.98
Impervious (acres)	0.00	0.00	0.00	3.49	3.49	16.02
					21.79	

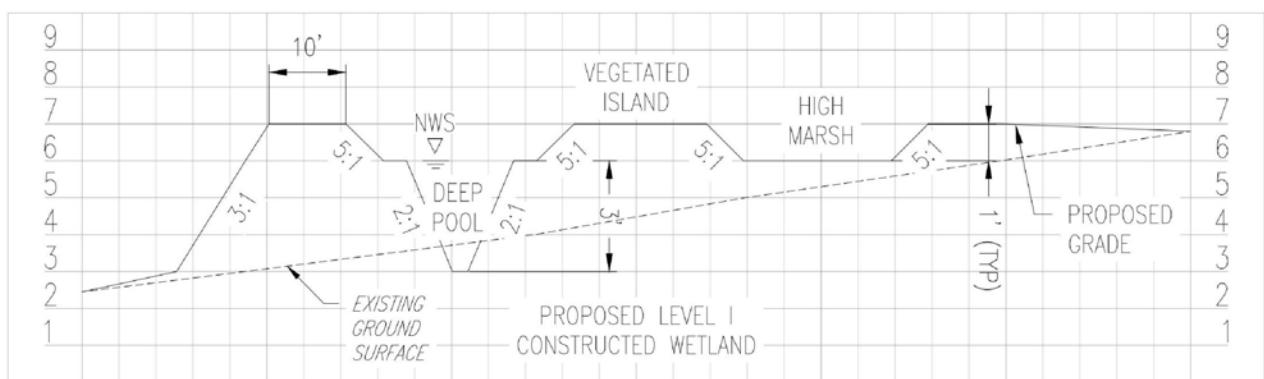
**BMP Selections**

Practice	Credit Area (acres)		Downstream Practice
12.a.Constructed Wetland #1 (Spec #13)	Impervious:	3.49	

Total Impervious Cover Treated (acres)	3.49
Total Turf Area Treated (acres)	18.30
Total TP Load Reduction Achieved in D.A. A (lb/yr)	8.99
Total TN Load Reduction Achieved in D.A. A (lb/yr)	32.15

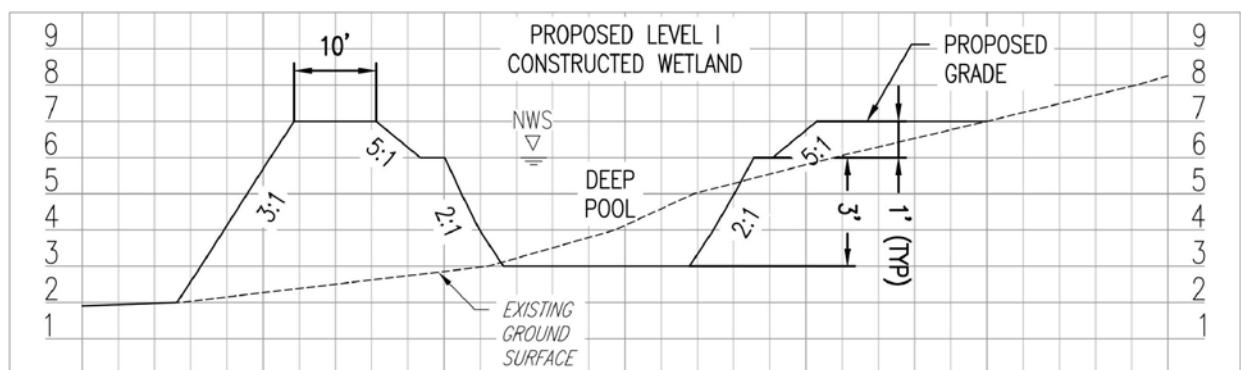
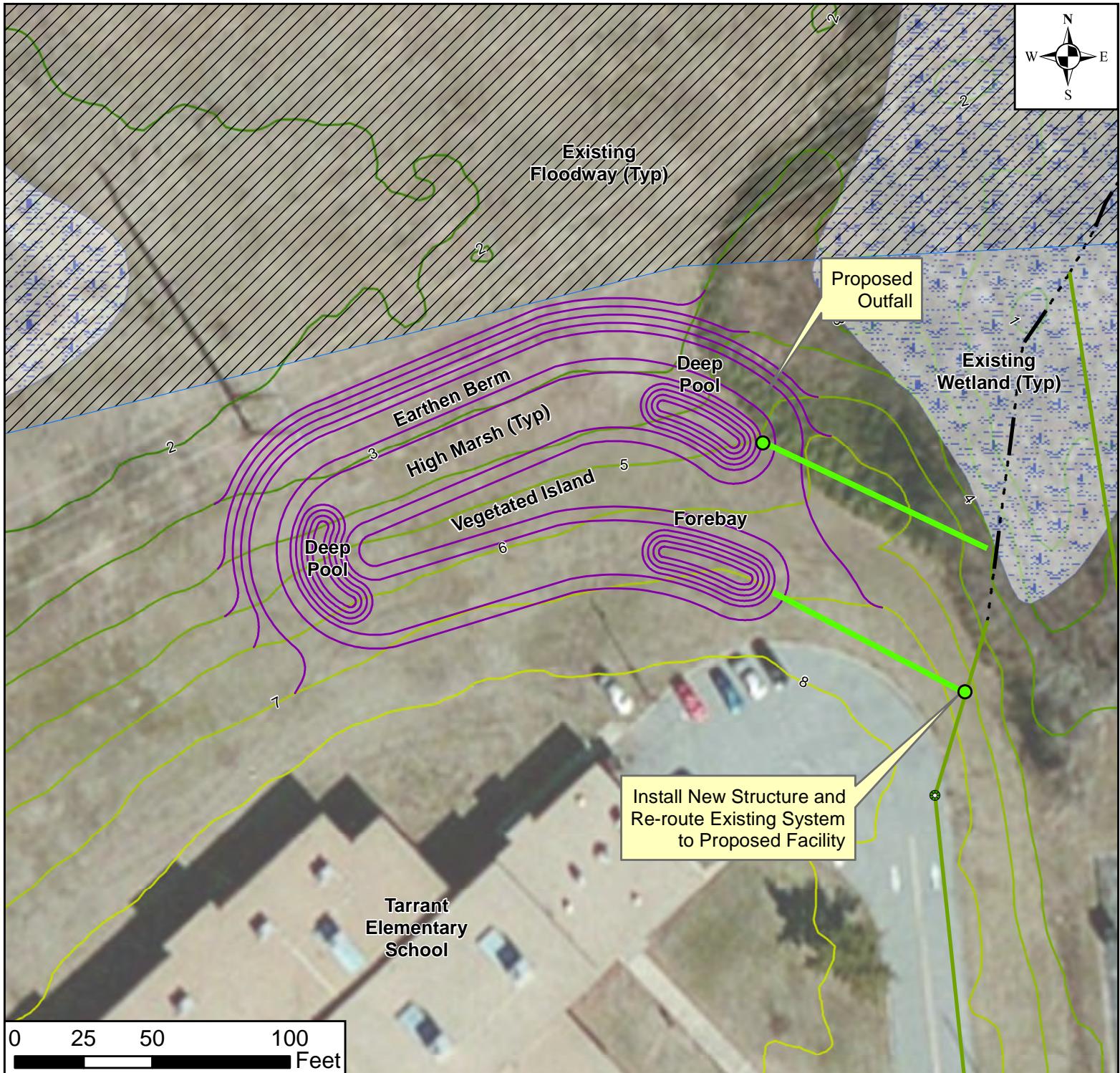
**Channel and Flood Protection**

	Weighted CN	1-year storm Adjusted CN	2-year storm Adjusted CN	10-year storm Adjusted CN
Target Rainfall Event (in)		0.00	0.00	0.00
D.A. A CN	83	100	100	100
D.A. B CN	0	100	100	100
D.A. C CN	0	100	100	100
D.A. D CN	0	100	100	100
D.A. E CN	0	100	100	100



Typical Cross-Section - N.T.S.

**Location B1: Cesar Tarrant Elementary School Level I Constructed Wetland**



Typical Cross-Section - N.T.S.

**Location B2: Cesar Tarrant Elementary School Level I Constructed Wetland**

## **Location B: Cesar Tarrant Elementary School**

### **Existing Conditions**

Cesar Tarrant Elementary School is located at 1589 Wingfield Drive in Hampton, VA. The school sits on an 18.3 acre (23.2% impervious) City of Hampton owned parcel within the Briarfield Watershed. There are currently no stormwater quantity/quality control measures on site. However there are conveyance systems such as roof drains and an existing storm pipe system collecting runoff from the onsite impervious areas. The current conveyance systems collect 5.2 acres (55.8% impervious) of rooftop, parking and surface drainage. The remainder of the site drains to the wetland area on the northern third of the site. The project area is located within both Chesapeake Bay Resource Protection Areas and Management Areas. This property is located within an AE floodplain and AE flood hazard zones; additionally there is a 0.2 percent annual chance of flood hazard for part of the site. There are no known or visible archeological sites, historical sites or other similar cultural resources located on this site. According to the National wetland Inventory mapping there were wetlands on the western and northern boundaries of the site however the proposed work is not anticipated to impact any of the wetlands.

### **Proposed Work**

The project consists of installing two (2) Level 1 Constructed Wetlands, with Facility B1 located on the southwest corner of the parcel and Facility B2 located on the eastern side of the property. The proposed facilities will treat approximately 6.03 acres (48.4% impervious), achieving a Phosphorus removal credit of 4.05 lbs per year. Both facilities will outfall into existing ditches within the wetlands. Total Project costs are \$258,000, equating to a cost per pound of phosphorus removal of \$63,700.

Work associated with constructing the proposed facilities includes the removal/relocation of an existing playground at the southwest facility and existing storm system modifications to divert stormwater to the proposed facilities. Landscaping and excavation are also major components for constructing the proposed stormwater practice. Preliminary investigations for ground water elevations demonstrate a high water table. It is anticipated that the high water table will assist with maintaining a healthy wetland.

The NRCS soil survey notes that soils within the proposed project area are a composition of Altavista-Urban Land Complex, Johnston Silt Loam and Udorthents-Dumps Complex. A preliminary soils investigation in the area of the proposed work confirmed the findings of the NRCS soils survey and showed that the soils were suitable for constructing a constructed wetland cell.

### **Limitations**

1. The facilities will be located on a school site so additional safety considerations will have to be taken into account.
2. The inverts of the existing storm system and discharge point of all roof drains are unknown. Preliminary exploration for underground facilities will need to be conducted.
3. Additional permitting may be required due to the proximity of the wetlands.
4. A significant amount of haul on material may be required on downslope side of stormwater facility depending on the characteristics of in-situ soils.

## **Items of Interest**

1. The proposed stormwater facility may achieve an additional 2.02 lbs of removal if a Level 2 facility can be constructed.

## **Location B Project Summary**

1. Site Description: Cesar Tarrant Elementary School (CLOSED)
2. Proposed Facility: Level I Constructed Wetland (x2)
3. Latitude: 37.021896°
4. Longitude: -76.408343°
5. Total Drainage Area: 6.03 acres
6. % Impervious: 48.4%
7. Total Nitrogen Removal: 14.47 lb N/year
8. Total Phosphorus Removal: 4.05 lb P/year
9. Total Suspended Solids Removal: 1,252.91 lb SS/year
10. Total Cost: \$258,000
11. Cost per lb P: \$63,700/lb P

Briarfield Watershed Study				
Location 'B' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 16,737	1.00	LS	\$ 16,737
<b>Site Preparation</b>				
Remove 18" RCP	\$ 20	145.00	LF	\$ 2,900
Staging and Storage Area	\$ 3,500	1.00	EA	\$ 3,500
Clearing and Grubbing	\$ 7,500	0.25	AC	\$ 1,875
<b>Earthwork</b>				
Excavation and dispose offsite	\$ 20	4075.00	CY	\$ 81,500
Topsoil (strip, stockpile, regrade)	\$ 5,000	0.50	AC	\$ 2,500
Shapping and Fine Grading	\$ 5,000	0.50	AC	\$ 2,500
Wetlands Plants & Landscaping	\$ 6,500	2.00	LS	\$ 13,000
<b>Structures</b>				
Outfall Structure & Piping	\$ 3,500	2.00	EA	\$ 7,000
End Section	\$ 750	2.00	EA	\$ 1,500
18" RCP	\$ 35	250.00	LF	\$ 8,750
24" RCP	\$ 48	80.00	LF	\$ 3,840
VDOT Structure	\$ 3,500	2.00	EA	\$ 7,000
Existing Structure Modification	\$ 2,000	1.00	EA	\$ 2,000
Class A1 RR	\$ 100	20.00	TN	\$ 2,000
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	2.00	EA	\$ 6,000
Temporary Silt Fence	\$ 3	1000.00	LF	\$ 3,000
Tree Protection	\$ 5	600.00	LF	\$ 3,000
Dewatering	\$ 5,000	2.00	LS	\$ 10,000
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	1.00	AC	\$ 1,000
Fertilizer	\$ 500	2.00	LS	\$ 1,000
General Stabilization seed mix	\$ 3,500	1.00	AC	\$ 3,500
<b>Subtotal Materials</b>				\$ 167,365
<b>SUBTOTAL= subtotal materials plus mobilization</b>				\$ 184,102
Design Fee				\$ 55,230
10% Contingency				\$ 18,410
<b>Construction (2016 \$)</b>				\$ 258,000
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				

Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014					
To be used w/ 2011 BMP Standards and Specifications					
Site Data					
Project Name: Briarfield Watershed Study - Location B - Cesar Tarrant Elem. School					
Date: February 2016					
<b>1. Post-Development Project &amp; Land Cover Information</b>					
Constants					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26			Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				
Land Cover (acres)					
	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	3.11	3.11
Impervious Cover (acres)	0.00	0.00	0.00	2.92	2.92
				Total	6.03
Rv Coefficients					
	A soils	B Soils	C Soils	D Soils	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
Land Cover Summary					
Forest/Open Space Cover (acres)	0.00				
Weighted Rv(forest)	0.00				
% Forest	0%				
Managed Turf Cover (acres)	3.11				
Weighted Rv(turf)	0.25				
% Managed Turf	52%				
Impervious Cover (acres)	2.92				
Rv(imperVIOUS)	0.95				
% ImperVIOUS	48%				
<b>Total Site Area (acres)</b>	<b>6.03</b>				
<b>Site Rv</b>	<b>0.59</b>				
Post-Development Treatment Volume (acre-ft)	0.30				
Post-Development Treatment Volume (cubic feet)	12,892				
Post_Development Load (TP) (lb/yr)	8.10	Post_Development Load (TN) (lb/yr)			57.95
Total Load (TP) Reduction Required (lb/yr)	5.63				

Drainage Area A																				
Drainage Area A Land Cover (acres)	A soils	B Soils	C Soils	D Soils	Total															
Forest/Open Space (acres)	0.00	0.00	0.00	0.00	0.00															
Managed Turf (acres)	0.00	0.00	0.00	3.11	3.11															
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00															
	Total				6.03															
<b>Apply Runoff Reduction Practices to Reduce Treatment Volume &amp; Post-Development Load in Drainage Area A</b>																				
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream Runoff Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Load from Upstream RR Practices (lbs)	Phosphorus Efficiency (%)	Load from Upstream RR Practices (lbs)	Remaining Runoff Volume (cf)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Upstream Runoff Practices (lbs)	Unreated Runoff Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Runoff Load (lbs)		
<b>1. Vegetated Roof</b>																				
1.a. Vegetated Roof #1 (Spec#1)	acres of green roof	40% runoff volume reduction	0.45	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
1.b. Vegetated Roof #2 (Spec #5)	acres of green roof	80% runoff volume reduction	0.60	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
<b>2. Rootop Disconnection</b>																				
2.a. Simple Disconnection to A/B Soils (Spec #3)	impervious acres disconnected	50% runoff volume reduction	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
2.b. Simple Disconnection to C/D Soils (Spec #3)	impervious acres disconnected	25% runoff volume reduction for treated area	0.25	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
2.c. To Soil Amended Filter Path as per practices (excluding CD soils) (Spec #4)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
2.d. To Dry Well or French Dran #1 (Micro-Bermed) (Spec #5) (See Spec #8)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
2.e. To Dry Well or French Dran #2 (Micro-Bermed) (Spec #5) (See Spec #8)	impervious acres disconnected	90% runoff volume reduction for treated area	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
2.f. To Rain Garden #1 (Micro-Bermed) (Spec #5) (See Spec #8)	impervious acres disconnected	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
2.g. To Rain Garden #2 (Micro-Bermed) (Spec #5) (See Spec #8)	impervious acres disconnected	80% runoff volume reduction for treated area	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00								
2.h. To Rainwater Harvesting (Spec #8)	impervious acres captured	based on tank size and design of harvested (See Spec #8)	0.00	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
2.i. To Stormwater Planter (Urban) (Spec #5) (Appendix A)	impervious acres disconnected	40% runoff volume reduction for treated area	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
<b>3. Permeable Pavement</b>																				
3.a. Permeable Pavement #1 (Spec #7)	acres of permeable pavement + areas where infiltration practice is applied	40% runoff volume reduction	0.45	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
3.b. Permeable Pavement #2 (Spec #7)	acres of permeable pavement	75% runoff volume reduction	0.75	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
<b>4. Grass Channel</b>																				
4.a. Grass Channel A/B Soils (Spec #3)	impervious acres draining to grass channel	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
4.b. turf surface draining to grass channels	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00									
4.c. Grass Channel C/D Soils (Spec #3)	impervious acres draining to grass channel	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
4.d. a/c. Grass Channel with Compost Amended Soils as per specs (see Spec #4)	turf acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
4.e. a/c. Grass Channel with Compost Amended Soils as per specs (see Spec #4)	impervious acres draining to grass channels	30% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
<b>4. Grass Channel</b>																				
4.f. a/c. Grass Channel with Compost Amended Soils as per specs (see Spec #4)	turf acres draining to grass channels	30% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
<b>5. Dry Swale</b>																				
5.a. Dry Swale #1 (Spec #10)	impervious acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00								
5.b. Dry Swale #2 (Spec #10)	turf acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00								
5.c. Dry Swale #2 (Spec #10)	impervious acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00								
<b>6. Bioretention</b>																				
6.a. Bioretention #1 or Urban Bioretention (Spec #5)	impervious acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
6.b. Bioretention #2 (Spec #5)	turf acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
6.c. Bioretention #2 (Spec #5)	impervious acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00								
<b>7. Infiltration</b>																				
7.a. Infiltration #1 (Spec #8)	impervious acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
7.b. Infiltration #2 (Spec #8)	turf acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00								
<b>8. Extended Detention Pond</b>																				
8.a. ED #1 (Spec #15)	impervious acres draining to ED	0% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
8.b. ED #2 (Spec #15)	turf acres draining to ED	0% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
8.c. ED #2 (Spec #15)	impervious acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
<b>8. Extended Detention Pond</b>																				
8.d. ED #1 (Spec #15)	impervious acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00								
<b>9. Sheetflow to Filter/Open Space</b>																				
9.a. Sheetflow to Conservation Area with A/B Soils (Spec #4)	impervious acres draining to open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
9.b. Sheetflow to Conservation Area with C/D Soils (Spec #4)	impervious acres draining to open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
9.c. Sheetflow to A Vegetated Filter Strip in A Soils or Compost Amended B/C/D Soils (Spec #2 & #4)	impervious acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
9.d. Sheetflow to A Vegetated Filter Strip in A Soils or Compost Amended B/C/D Soils (Spec #2 & #4)	turf acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00								
<b>9. Sheetflow to Filter Strip</b>																				
9.e. TOTAL IMPERVIOUS COVER TREATED (ac)																				
9.f. TOTAL TURF AREA TREATED (ac)																				
9.g. AREA CHECK OK																				
9.h. TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)																				
9.i. TOTAL RUNOFF REDUCTION IN D.A. (lb/yr)																				
9.j. PHOSPHORUS REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/yr)																				
9.k. SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS																				
<b>Apply Practices that Remove Pollutants but Do Not Reduce Runoff Volume</b>																				
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream Runoff Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Load from Upstream RR Practices (lbs)	Phosphorus Efficiency (%)	Load from Upstream RR Practices (lbs)	Remaining Runoff Volume (cf)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Upstream Runoff Practices (lbs)	Unreated Runoff Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Runoff Load (lbs)		
<b>10. Wet Swale (Coastal Plain)</b>																				
10.a. Wet Swale #1 (Spec #11)	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00								
10.b. Wet Swale #2 (Spec #11)	turf acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00								
10.c. Wet Swale #1 (Spec #11)	impervious acres draining to wet swale	20% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00								
10.d. Wet Swale #2 (Spec #11)	turf acres draining to wet swale	20% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00								
<b>11. Filtering Practices</b>																				
11.a. Filtering Practice #1 (Spec #12)	impervious acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	0.00	0.00								
11.b. Filtering Practice #1 (Spec #12)	turf acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	0.00	0.00								
11.c. Filtering Practice #2 (Spec #12)	impervious acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	65	0.00	0.00	0.00	0.00								
11.d. Filtering Practice #2 (Spec #12)	turf acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	65	0.00	0.00	0.00	0.00								
<b>12. Constructed Wetland</b>																				
12.a. Constructed Wetland #1 (Spec #13)	impervious acres draining to wetland	0% runoff volume reduction	0.00	2.50	0	0	0	10070	50	0.00	6.32	3.16								
12.b. Constructed Wetland #2 (Spec #13)	turf acres draining to wetland	0% runoff volume reduction	0.00	3.11	0	0														



Site Results		D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	2.92	0.00	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	2.92	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA	3.11	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA TREATED	3.11	0.00	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	OK.	
<b>Phosphorus</b>							
TOTAL TREATMENT VOLUME (cf)	12,892						
TOTAL PHOSPHORUS LOAD REDUCTION REQUIRED (LB/YEAR)	5.63						
RUNOFF REDUCTION (cf)	0						
PHOSPHORUS LOAD REDUCTION ACHIEVED (LB/YR)	4.05						
ADJUSTED POST-DEVELOPMENT PHOSPHORUS LOAD (TP) (lb/yr)	4.05						
REMAINING PHOSPHORUS LOAD REDUCTION (LB/YR) NEEDED	1.58						
<b>Nitrogen (for information purposes)</b>							
TOTAL TREATMENT VOLUME (cf)	12,892						
RUNOFF REDUCTION (cf)	0						
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	14.47						
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TN) (lb/yr)	43.48						

## Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

**Site Data Summary**

Total Rainfall = 43 inches

**Site Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	3.11	3.11	51.58
Impervious (acres)	0.00	0.00	0.00	2.92	2.92	48.42
					6.03	100.00

Site Rv	0.59
Post Development Treatment Volume (ft <sup>3</sup> )	12892
Post Development TP Load (lb/yr)	8.10
Post Development TN Load (lb/yr)	57.95
Total TP Load Reduction Required (lb/yr)	5.63

Total Runoff Volume Reduction (ft <sup>3</sup> )	0
Total TP Load Reduction Achieved (lb/yr)	4
Total TN Load Reduction Achieved (lb/yr)	14.47
Adjusted Post Development TP Load (lb/yr)	4.05
Remaining Phosphorous Load Reduction (lb/yr) Required	1.58

**Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	3.11	0.00	0.00	0.00	0.00	3.11
Impervious (acres)	2.92	0.00	0.00	0.00	0.00	2.92
						6.03

**Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	4.05	0.00	0.00	0.00	0.00	4.05
TN Load Red. (lb/yr)	14.47	0.00	0.00	0.00	0.00	14.47

**Drainage Area A Summary****Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	3.11	3.11	51.58
Impervious (acres)	0.00	0.00	0.00	2.92	2.92	48.42
					6.03	

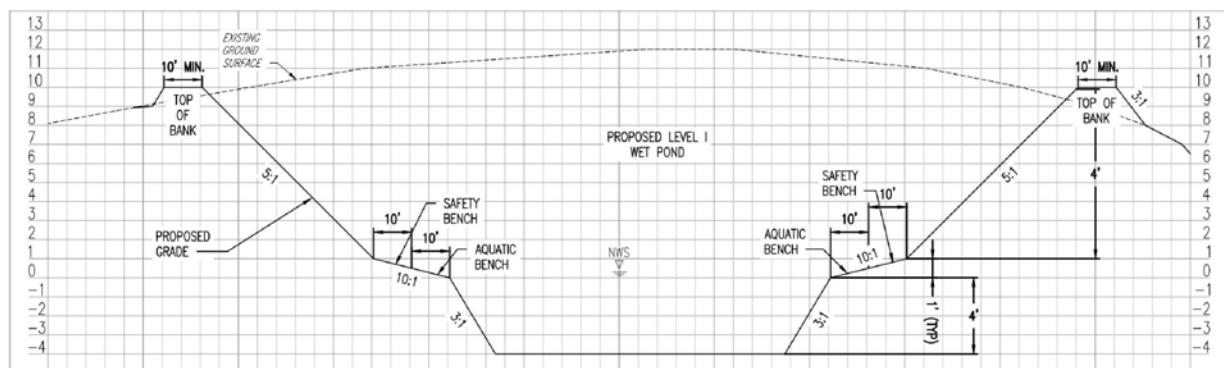
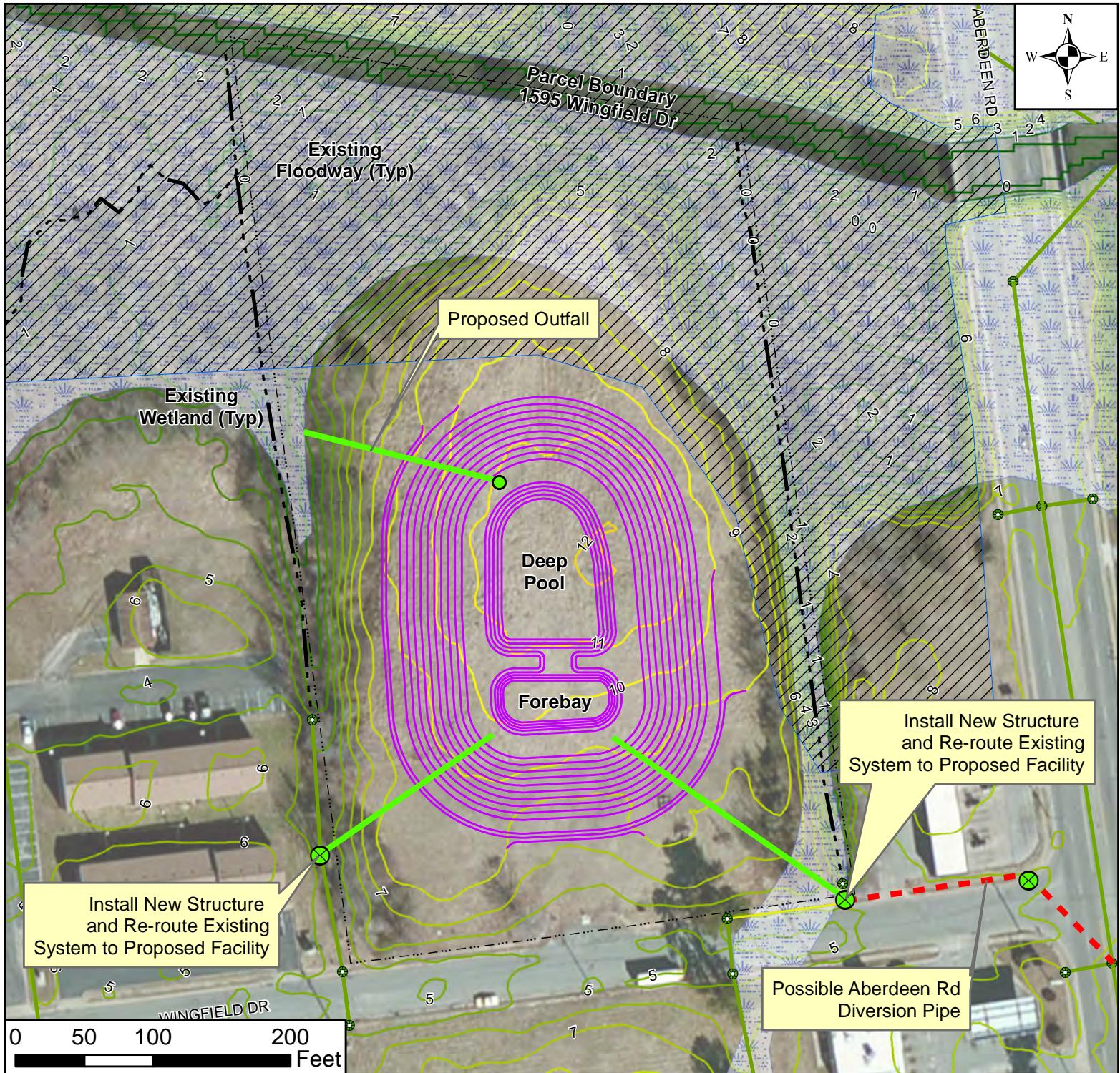
**BMP Selections**

Practice	Credit Area (acres)		Downstream Practice
12.a.Constructed Wetland #1 (Spec #13)	Impervious:	3.49	

Total Impervious Cover Treated (acres)	2.92
Total Turf Area Treated (acres)	3.11
Total TP Load Reduction Achieved in D.A. A (lb/yr)	4.05
Total TN Load Reduction Achieved in D.A. A (lb/yr)	14.47

**Channel and Flood Protection**

	Weighted CN	1-year storm Adjusted CN	2-year storm Adjusted CN	10-year storm Adjusted CN
Target Rainfall Event (in)		0.00	0.00	0.00
D.A. A CN	89	100	100	100
D.A. B CN	0	100	100	100
D.A. C CN	0	100	100	100
D.A. D CN	0	100	100	100
D.A. E CN	0	100	100	100



Typical Cross-Section - N.T.S.

**Location C: 1595 Wingfield Dr (Vacant Lot) Level I Wet Pond**

## **Location C: 1595 Wingfield Drive (Vacant Lot)**

### **Existing Condition**

The parcel at 1595 Wingfield Drive, Hampton, VA is a 5.23 acre (0% impervious) vacant lot which is currently for sale. The current owner is Home Away From Home Family Life/Education Center, Inc. There are currently no stormwater quantity/quality control measures onsite. However there are two (2) wetland ditches running along both the east and west property boundary which receive drainage from stormwater collection systems, approximately 11.66 acres (58% impervious), from the nearby apartment complex off of Addison Court. The project area is located within both Chesapeake Bay Resource Protection Areas and Management Areas. This property is located within an AE floodplain and AE flood hazard zones; additionally there is a 0.2 percent annual chance of flood hazard for part of the site. There are no known or visible archeological sites, historical sites or other similar cultural resources located on this site.

### **Proposed Work**

A Level 1 Wet Pond is proposed to be constructed at this location. The proposed facility will treat approximately 14.09 acres (48.4% impervious), achieving a phosphorus removal credit of 8.51 lbs per year. The facility will outfall into one of the onsite wetland ditches. Total Project costs are \$1,091,000. The cost per pound of phosphorus removal is estimated to be \$128,200.

Work associated with constructing the proposed facility includes excavation to depths of 20+ feet below existing grade and storm system diversions to intersect and direct flows to the proposed facility.

Pavements restoration and traffic control are required to complete the storm system diversions.

Significant stabilization, shoring and dewatering operations are required to ensure the site is stable during construction.

The NRCS soils survey shows soils within the proposed project area are a composition of Altavista-Urban Land Complex, Bohicket Muck, Johnston Silt Loam and Udorthents-Dumps Complex. A preliminary soils investigation was not conducted in the area of the proposed work to confirm the NRCS soils survey, however the composition of soils provided in the soils survey appear to be adequate to construct a wet pond.

### **Limitations**

1. The overall site elevation will need to be lowered approximately 13 to 15 feet from the existing 12' above mean sea level in order to be at the correct invert to receive flow from the nearby storm systems.
2. Since this property is located in a Coastal Plain region the wet pond facilities pollutant removal efficiencies are lower.
3. Additional permitting may be required due to the proximity of the wetlands.
4. There will be significant offsite work, the extension of a closed pipe system, associated with this project.

### **Items of Interest**

1. The proposed stormwater facilities may achieve an additional 3.79 lbs of removal if a Level 2 facility can be constructed.
2. There is the potential to disconnect the storm system running along Aberdeen Road and re-route the water to discharge into the proposed facility before entering Newmarket Creek. This provides the opportunity to treat an additional 56 acres (74.2% impervious) which will provide an additional phosphorus removal credit of 44.17 lbs per year.

3. During design of the stormwater facility the engineer should model diverted flows from the Aberdeen Rd drainage system to ascertain if the hydraulic grade line will lower. There may be a cost effective way to obtain additional phosphorus removal and lower the HGL in Aberdeen's drainage system.

### **Location C Project Summary**

1. Site Description: Aberdeen Road Disconnect - 1595 Wingfield Drive (Vacant Lot)
2. Proposed Facility: Level I Wet Pond
3. Latitude: 37.022479°
4. Longitude: -76.405675°
5. Total Drainage Area: 14.09 acres
6. % Impervious: 48.4%
7. Total Nitrogen Removal: 27.07 lb N/year
8. Total Phosphorus Removal: 8.51 lb P/year
9. Total Suspended Solids Removal: 2,621.92 lb SS/year
10. Total Cost: \$1,091,000
11. Cost per lb P: \$128,200/lb P

Briarfield Watershed Study				
Location 'C' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 66,546	1.00	LS	\$ 66,546
<b>Site Preparation</b>				
Staging and Storage Area	\$ 3,500	1.00	EA	\$ 3,500
Clearing and Grubbing	\$ 1,000	1.00	LS	\$ 1,000
Land Acquisition	\$ 325,000	1.00	LS	\$ 325,000
<b>Earthwork</b>				
Excavation and dispose offsite	\$ 20	18000.00	CY	\$ 360,000
Topsoil (strip, stockpile, regrade)	\$ 5,000	1.25	AC	\$ 6,250
Shaping and Fine Grading	\$ 5,000	2.00	AC	\$ 10,000
Plants & Landscaping	\$ 8,000	1.00	LS	\$ 8,000
<b>Structures</b>				
Outfall Structure & Piping	\$ 3,500	1.00	EA	\$ 3,500
End Section	\$ 750	2.00	EA	\$ 1,500
15" RCP	\$ 30	148.00	LF	\$ 4,440
30" RCP	\$ 52	344.00	LF	\$ 17,888
VDOT Structures	\$ 4,000	5.00	EA	\$ 20,000
Class A1 RR	\$ 100	20.00	TN	\$ 2,000
Diversion Pipe	\$ 120	224.00	LF	\$ 26,880
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	1.00	EA	\$ 3,000
Temporary Silt Fence	\$ 3	1800.00	LF	\$ 5,400
Tree Protection	\$ 5	800.00	LF	\$ 4,000
Dewatering	\$ 7,500	1.00	LS	\$ 7,500
Traffic Control	\$ 4,500	1.00	LS	\$ 4,500
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	1.25	AC	\$ 1,250
Fertilizer	\$ 500	1.25	LS	\$ 625
General Stabilization seed mix	\$ 3,500	1.25	AC	\$ 4,375
<b>Subtotal Materials</b>				\$ 820,608
<b>SUBTOTAL= subtotal materials plus mobilization</b>				\$ 887,154
Design Fee				\$ 115,330
10% Contingency				\$ 88,715
<b>Construction (2016 \$)</b>				\$ 1,091,000
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				

Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014					
To be used w/ 2011 BMP Standards and Specifications					
Site Data					
Project Name: Briarfield Watershed Study - Location C - Wingfield Dr Vacant Lot					
Date: February 2016					
<b>1. Post-Development Project &amp; Land Cover Information</b>					
<b>Constants</b>					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26		Nitrogen EMC (mg/L)	1.86	
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				
<b>Land Cover (acres)</b>					
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	<b>Totals</b>
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	7.27	7.27
Impervious Cover (acres)	0.00	0.00	0.00	6.83	6.83
				<b>Total</b>	14.10
<b>Rv Coefficients</b>					
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
<b>Land Cover Summary</b>					
Forest/Open Space Cover (acres)	0.00				
Weighted Rv(forest)	0.00				
% Forest	0%				
Managed Turf Cover (acres)	7.27				
Weighted Rv(turf)	0.25				
% Managed Turf	52%				
Impervious Cover (acres)	6.83				
Rv(impermeous)	0.95				
% Impermeous	48%				
<b>Total Site Area (acres)</b>	14.10				
<b>Site Rv</b>	0.59				
Post-Development Treatment Volume (acre-ft)	0.69				
Post-Development Treatment Volume (cubic feet)	30,151				
Post_Development Load (TP) (lb/yr)	18.94	Post_Development Load (TN) (lb/yr)	135.52		
Total Load (TP) Reduction Required (lb/yr)	13.16				

Drainage Area A																		
Drainage Area A Land Cover (acres)		0 Soils		0 Soils		0 Soils		Total	Land Cover Rx									
Forest/Open Space (acres)		0.00		0.00		0.00		0.00	0.00									
Managed Turf (acres)		0.00		0.00		7.27		7.27	0.25									
Impervious Cover (acres)		0.00		0.00		0.00		0.00	0.00									
								14.10	Post Development Treatment Volume (cu)		30151							
<b>Apply Runoff Reduction Practices to Reduce Treatment Volume &amp; Post-Development Load in Drainage Area A</b>																		
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream RR Practice (cu)	Runoff Reduction (cu)	Remaining Runoff Volume (cu)	Phosphorus Efficiency (%)	Upstream RR Practices (bs)	Reduced Phosphorus Load to Practice	Phosphorus Removed By Practice (bs.)	Remaining Phosphorus Load (bs.)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Upstream RR Practice (bs.)	Estimated Nitrogen Load to Practice (bs.)	Effluent Removed By Practice (bs.)	Remaining Nitrogen Load (bs.)
<b>1. Vegetated Roof</b>															<b>1. Green Roof</b>			
1.a. Vegetated Roof #1 (Spec #6)	acres of green roof	45% runoff volume reduction	0.45	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
1.b. Vegetated Roof #2 (Spec #5)	acres of green roof	65% runoff volume reduction	0.60	0.03	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
<b>2. Rooftop Disconnection</b>															<b>2. Impervious Surface Disconnection</b>			
2.a. Simple Disconnection to AB Soils (Spec #1)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
2.b. Simple Disconnection to C/D Soils (Spec #1)	impervious acres disconnected	25% runoff volume reduction for treated area	0.25	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
2.c. To Soil Amended Filter Path as per Specification #4	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
2.d. To Dry Well or French Drain #1 (Specification #1)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00
2.e. To Dry Well or French Drain #2 (Specification #2)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00
2.f. To Rain Garden #1 (Micro-Bioswale) (Spec #4)	impervious acres disconnected	40% volume capture	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	40	0.00	0.00	0.00	0.00
2.g. To Rain Garden #2 (Micro-Bioswale) (Spec #5)	impervious acres disconnected	40% runoff volume reduction for treated area	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00	0.00	60	0.00	0.00	0.00	0.00
2.h. To Rainwater Harvesting (Spec #6)	impervious acres captured	Spec #6	0.00	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
2.i. To Stormwater Planter (Urban Biofiltration) (Spec #9, Appendix A)	impervious acres disconnected	40% runoff volume reduction for treated area	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	40	0.00	0.00	0.00	0.00
<b>3. Permeable Pavement</b>															<b>3. Permeable Pavement</b>			
3.a. Permeable Pavement #1 (Spec #7)	acres of permeable pavement + areas of "general" (irrigated) impervious pavement	45% runoff volume reduction	0.45	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00
3.b. Permeable Pavement #2 (Spec #7)	acres of permeable pavement	25% runoff volume reduction	0.75	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00
<b>4. Grass Channel</b>															<b>4. Grass Channel</b>			
4.a. Grass Channel AB Soils (Spec #3)	impervious acres draining to grass channels	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00
	turf acres draining to grass channels	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00
4.b. Grass Channel C/D Soils (Spec #3)	impervious acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00
	turf acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00
4.c. Grass Channel with Compact Amended Soils as per Spec #6 (See Spec #4)	impervious acres draining to grass channels	50% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00
	turf acres draining to grass channels	30% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00
<b>5. Dry Swale</b>															<b>5. Dry Swale</b>			
5.a. Dry Swale #1 (Spec #10)	impervious acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00
	surf acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00
5.b. Dry Swale #2 (Spec #10)	impervious acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00	0.00	35	0.00	0.00	0.00	0.00
	surf acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00	0.00	35	0.00	0.00	0.00	0.00
<b>6. Bioretention</b>															<b>6. Bioretention</b>			
6.a. Bioretention #1 (Urban Bioretention) (Spec #6)	impervious acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	40	0.00	0.00	0.00	0.00
	surf acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	40	0.00	0.00	0.00	0.00
6.b. Bioretention #2 (Spec #9)	impervious acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00	0.00	60	0.00	0.00	0.00	0.00
	surf acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00	0.00	60	0.00	0.00	0.00	0.00
<b>7. Infiltration</b>															<b>7. Infiltration</b>			
7.a. Infiltration #1 (Spec #8)	impervious acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00
	surf acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00
7.b. Infiltration #2 (Spec #8)	impervious acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00
	surf acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00
<b>8. Extended Detention Pond</b>															<b>8. Extended Detention Pond</b>			
8.a. ED #1 (Spec #15)	impervious acres draining to ED	10% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	10	0.00	0.00	0.00	0.00
	surf acres draining to ED	10% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	10	0.00	0.00	0.00	0.00
8.b. ED #2 (Spec #15)	impervious acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	10	0.00	0.00	0.00	0.00
	surf acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	10	0.00	0.00	0.00	0.00
<b>9. Sheetflow to Filter/Open Space</b>															<b>9. Sheetflow to Conservation Area or Filter Strip</b>			
9.a. Sheetflow to Conservation Area with A/B Soils (Spec #2)	impervious acres draining to conservation area	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
	surf acres draining to conservation area	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
9.b. Sheetflow to Conservation Area with C/D Soils (Spec #2)	impervious acres draining to conservation area	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
	surf acres draining to conservation area	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
9.c. Sheetflow to Vegetated Filter Strip in A/S or Coarse Gravel Soils (Spec #2 & 4)	impervious acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
	surf acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
<b>10. Wet Swales (Coastal Plain)</b> <th data-kind="ghost"></th> <th data-cs="3" data-kind="parent"><b>10. Wet Swales (Coastal Plain)</b></th> <th data-kind="ghost"></th> <th data-kind="ghost"></th>															<b>10. Wet Swales (Coastal Plain)</b>			
10.a. Wet Swale #1 (Spec #11)	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00
	surf acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00
10.b. Wet Swale #2 (Spec #11)	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00	0.00	35	0.00	0.00	0.00	0.00
	surf acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00	0.00	35	0.00			



Site Results		D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	6.83	0.00	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	6.83	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA	7.27	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA TREATED	7.27	0.00	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	OK.	
<b>Phosphorus</b>							
TOTAL TREATMENT VOLUME (cf)	30,151						
TOTAL PHOSPHORUS LOAD REDUCTION REQUIRED (LB/YEAR)	13.16						
RUNOFF REDUCTION (cf)	0						
PHOSPHORUS LOAD REDUCTION ACHIEVED (LB/YR)	8.51						
ADJUSTED POST-DEVELOPMENT PHOSPHORUS LOAD (TP) (lb/yr)	10.43						
REMAINING PHOSPHORUS LOAD REDUCTION (LB/YR) NEEDED	4.65						
<b>Nitrogen (for information purposes)</b>							
TOTAL TREATMENT VOLUME (cf)	30,151						
RUNOFF REDUCTION (cf)	0						
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	27.07						
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TN) (lb/yr)	108.45						

## Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

**Site Data Summary**

Total Rainfall = 43 inches

**Site Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	7.27	7.27	51.56
Impervious (acres)	0.00	0.00	0.00	6.83	6.83	48.44
					14.10	100.00

Site Rv	0.59
Post Development Treatment Volume (ft <sup>3</sup> )	30151
Post Development TP Load (lb/yr)	18.94
Post Development TN Load (lb/yr)	135.52
Total TP Load Reduction Required (lb/yr)	13.16

Total Runoff Volume Reduction (ft <sup>3</sup> )	0
Total TP Load Reduction Achieved (lb/yr)	9
Total TN Load Reduction Achieved (lb/yr)	27.07
Adjusted Post Development TP Load (lb/yr)	10.43
Remaining Phosphorous Load Reduction (lb/yr) Required	4.65

**Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	7.27	0.00	0.00	0.00	0.00	7.27
Impervious (acres)	6.83	0.00	0.00	0.00	0.00	6.83
						14.10

**Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	8.51	0.00	0.00	0.00	0.00	8.51
TN Load Red. (lb/yr)	27.07	0.00	0.00	0.00	0.00	27.07

**Drainage Area A Summary**Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	7.27	7.27	51.56
Impervious (acres)	0.00	0.00	0.00	6.83	6.83	48.44
					14.10	

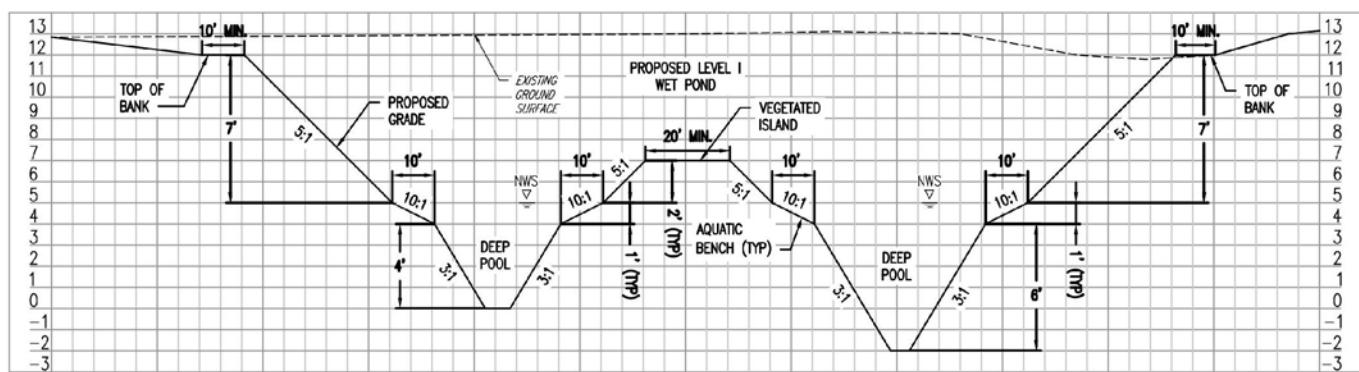
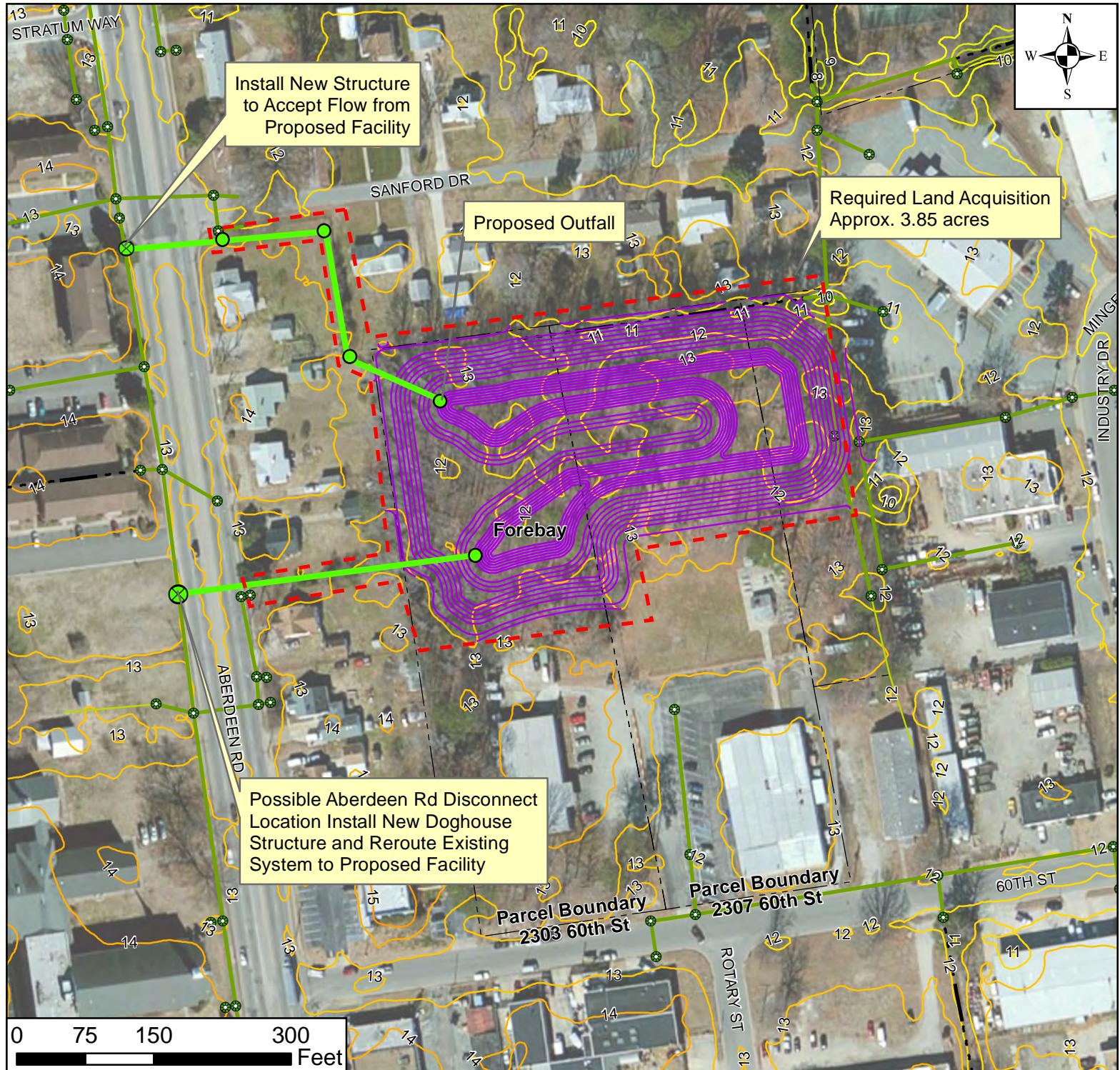
BMP Selections

Practice	Credit Area (acres)		Downstream Practice
12.a.Constructed Wetland #1 (Spec #13)	Impervious:	3.49	

Total Impervious Cover Treated (acres)	6.83
Total Turf Area Treated (acres)	7.27
Total TP Load Reduction Achieved in D.A. A (lb/yr)	8.51
Total TN Load Reduction Achieved in D.A. A (lb/yr)	27.07

**Channel and Flood Protection**

	Weighted CN	1-year storm Adjusted CN	2-year storm Adjusted CN	10-year storm Adjusted CN
Target Rainfall Event (in)		0.00	0.00	0.00
D.A. A CN	89	100	100	100
D.A. B CN	0	100	100	100
D.A. C CN	0	100	100	100
D.A. D CN	0	100	100	100
D.A. E CN	0	100	100	100



Typical Cross-Section - N.T.S.

**Location D: Aberdeen Rd Disconnect Level I Wet Pond**

## **Location D: Aberdeen Rd Disconnect**

### **Existing Condition**

The 60th Street site located off of Aberdeen Road in Hampton, VA, abuts three (3) adjacent properties all with wooded acreage on the northern half of the parcels. The parcel at 2303 60th Street is currently a storage warehouse/office building, owned by Prillamans Property Management, LLC, with approximately 1.5 acres of wooded land. The parcel at 2307 60th Street and the adjacent parcel to the northeast (no known address) are owned by the Newport News Moose Lodge #1119 and have approximately 2.2 acres of wooded land. Drainage from the wooded property is sheet flow that drains to a ditch on the northeast corner of the property, discharging into a closed pipe storm system then ultimately an open ditch behind Lindsay Middle School and the West Hampton Community Center. The project area is not located within a Chesapeake Bay Resource Protection Area. These properties are not located within a flood hazard zone. There are no known or visible archeological sites, historical sites or other similar cultural resources located on this site.

### **Proposed Work**

A Level 1 Wet Pond is proposed for this site. Property will have to be purchased from the referenced property owners. The proposed facility will receive redirected stormwater runoff from the stormwater collection system in Aberdeen Road. The facility will serve to treat stormwater runoff for phosphorus removal and mitigate hydraulic grade line in the Aberdeen Rd stormwater system. There are approximately 30.6 acres of impervious (59.8%) in the watershed. The level 1 Wet Pond will achieve a phosphorus removal reduction of 20.98 lbs per year. The existing stormwater system in Aberdeen Rd will need to be modified to divert flows to the proposed facility, then outfall back into the Aberdeen system into a new downstream structure near Sanford Drive. Total Project costs are estimated to be \$1,466,000, which is equivalent to \$69,900 per pound of phosphorus removal.

Work associated with constructing the proposed facility includes excavation depths in excess of 10 feet below existing grade and within a major collector road. New storm pipe diversions will intersect and redirect flows to the proposed wet pond facility. An outfall control structure will control and direct runoff back into the existing storm pipe system In Aberdeen Road. This new system will require pavement cuts and open trenches with significant traffic control required to complete the storm pipe system diversions. Significant stabilization, shoring and dewatering operations are required to secure the site during construction due to the high water table, large upstream area and tidal influence.

The NRCS soils survey shows soils within the proposed project area are almost entirely Tomotley-Urban Land Complex. A preliminary soils investigation was not conducted in the area of the proposed work to confirm the NRCS soils survey, however the composition of soils provided in the soils survey along with the known high water table appear to offer conditions adequate to construct a wet pond.

### **Limitations**

1. Due to the invert of the existing Aberdeen Road system, the elevations in the facility will need to be approximately 13 - 15 feet deep to adequately store a permanent pool at least 6' deep.
2. Due to the confined area, which is developed on all sides, several outfalls will be constructed to ensure water evacuates from the pond during heavy storm events.
3. Approximately 3.85 acres of land will need to be acquired by the City to construct the facility. An estimate of cost is noted in the cost opinion provided with this report and is based on land value at the time of this report.

4. Since this property is located in a Coastal Plain region, the facilities pollutant removal efficiencies will be lower than other regions for a wet pond.
5. Easements from private property owners will need to be acquired.
6. Will most likely have to provide flow restrictors in storm system in Aberdeen Road which will be added maintenance for City staff.

### **Items of Interest**

1. The proposed stormwater facilities may achieve an additional 9.32 lbs of removal if a Level 2 facility can be constructed.
2. The facility will attenuate larger flows from upstream during heavy storm events.
3. It is possible this facility may serve as attenuation with no water quality component.

### **Location D Project Summary**

1. Site Description: Aberdeen Road Disconnect - Upstream
2. Latitude: 37.015832°
3. Longitude: -76.401845°
4. Total Drainage Area: 30.60 acres
5. % Impervious: 59.8%
6. Total Nitrogen Removal: 66.70 lb N/year
7. Total Phosphorus Removal: 20.98 lb P/year
8. Total Suspended Solids Removal: 6,357.95 lb SS/year
9. Total Cost: \$1,466,000
10. Cost per lb P: \$69,900/lb P

Briarfield Watershed Study				
Location 'D' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 83,557	1.00	LS	\$ 83,556.75
<b>Site Preparation</b>				
Staging and Storage Area	\$ 5,500	1.00	EA	\$ 5,500
Clearing and Grubbing	\$ 7,500	3.00	AC	\$ 22,500
Land Acquisition	\$ 325,000	1.00	LS	\$ 325,000
Easement Acquisition	\$ 30,000	1.00	LS	\$ 30,000
<b>Earthwork</b>				
Excavation and dispose offsite	\$ 20	25,000.00	CY	\$ 500,000
Topsoil (strip, stockpile, regrade)	\$ 5,000	1.75	AC	\$ 8,750
Shaping and Fine Grading	\$ 5,000	3.00	AC	\$ 15,000
Plants & Landscaping	\$ 12,000	1.00	LS	\$ 12,000
<b>Structures</b>				\$ -
Outfall Structure	\$ 4,500	1.00	EA	\$ 4,500
End Section	\$ 750	1.00	EA	\$ 750
24" RCP Outfall Pipe	\$ 85	512.00	LF	\$ 43,520
24" RCP Diversion Pipe	\$ 80	328.00	LF	\$ 26,240
VDOT Storm Structures	\$ 4,500	6.00	EA	\$ 27,000
Class A1 RR	\$ 100	100.00	TN	\$ 10,000
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	1.00	EA	\$ 3,000
Temporary Silt Fence	\$ 3	2,500.00	LF	\$ 7,500
Tree Protection	\$ 5	1,000.00	LF	\$ 5,000
Dewatering	\$ 7,500	1.00	LS	\$ 7,500
Traffic Control	\$ 4,500	1.00	LS	\$ 4,500
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	2.75	AC	\$ 2,750
Fertilizer	\$ 500	1.00	LS	\$ 500
General Stabilization seed mix	\$ 3,500	2.75	AC	\$ 9,625
<b>Subtotal Materials</b>				\$ 1,071,135
<b>SUBTOTAL= subtotal materials plus mobilization</b>				\$ 1,154,692
Design Fee				\$ 196,298
10% Contingency				\$ 115,469
<b>Construction (2016 \$)</b>				\$ 1,466,000
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				

Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014					
To be used w/ 2011 BMP Standards and Specifications					
Site Data					
Project Name: Briarfield Watershed Study - Location D - Aberdeen Rd Disconnect					
Date: February 2016					
<b>1. Post-Development Project &amp; Land Cover Information</b>					
<b>Constants</b>					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26			Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				
<b>Land Cover (acres)</b>					
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	<b>Totals</b>
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	12.28	12.28
Impervious Cover (acres)	0.00	0.00	0.00	18.31	18.31
				<b>Total</b>	30.59
<b>Rv Coefficients</b>					
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
<b>Land Cover Summary</b>					
Forest/Open Space Cover (acres)	0.00				
Weighted Rv(forest)	0.00				
% Forest	0%				
Managed Turf Cover (acres)	12.28				
Weighted Rv(turf)	0.25				
% Managed Turf	40%				
Impervious Cover (acres)	18.31				
Rv(impermeable)	0.95				
% Impermeable	60%				
<b>Total Site Area (acres)</b>	30.59				
<b>Site Rv</b>	0.67				
Post-Development Treatment Volume (acre-ft)	1.71				
Post-Development Treatment Volume (cubic feet)	74,286				
<b>Post_Development Load (TP) (lb/yr)</b>	46.67	<b>Post_Development Load (TN) (lb/yr)</b>	333.90		
<b>Total Load (TP) Reduction Required (lb/yr)</b>	34.13				

Drainage Area A																				
Drainage Area A Land Cover (acres)		Imp.	Permeable	Grass	Sod	Total	Land Cover %													
Forest/Open Space (acres)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Post Development Treatment Volume (cf)	74260											
Managed Turf (acres)	0.00	0.00	0.00	12.25	12.25	0.25														
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	0.00	0.00													
								Total	30.59											
<b>Apply Runoff Reduction Practices to Reduce Treatment Volume &amp; Post-Development Load in Drainage Area A</b>																				
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream RR Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Upstream Load from Upstream RR Practices (lbs.)	Impaired Phosphorus Load to Practice	Phosphorus Removed By Practice (lbs.)	Remaining Phosphorus Load (lbs.)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Upstream RR Practices (lbs.)	Estimated Nitrogen Load to Practice (lbs.)	Effluent Removed By Practice (lbs.)	Remaining Nitrogen Load (lbs.)		
<b>1. Vegetated Roof</b>															<b>1. Green Roof</b>					
1.a. Vegetated Roof #1 (Spec #6)	acres of green roof	45% runoff volume reduction	0.45	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
1.b. Vegetated Roof #2 (Spec #5)	acres of green roof	60% runoff volume reduction	0.60	0.03	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
<b>2. Rooftop Disconnection</b>															<b>2. Impervious Surface Disconnection</b>					
2.a. Simple Disconnection to A/B Soils (Spec #1)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
2.b. Simple Disconnection to C/D Soils (Spec #1)	impervious acres disconnected	25% runoff volume reduction for treated area	0.25	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
2.c. To Soil Amended Path as per Specification #4	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
2.d. To Dry Well or French Drain #1 (Spec #6)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00	0.00	
2.e. To Dry Well or French Drain #2 (Micro-Infiltration #2) (Spec #8)	impervious acres disconnected	50% runoff volume reduction for treated area	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00	0.00	
2.f. To Rain Garden #1 (Micro-Bioswale) (Spec #6)	impervious acres disconnected	40% runoff capture	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	40	0.00	0.00	0.00	0.00	0.00	
2.g. To Rain Garden #2 (Micro-Bioswale) (Spec #9)	impervious acres disconnected	40% runoff volume reduction for treated area	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00	0.00	60	0.00	0.00	0.00	0.00	0.00	
2.h. To Rainwater Harvesting (Spec #9)	impervious acres captured	Spec #9	0.00	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
2.i. To Stormwater Planter (Urban Biofiltration) (Spec #9, Appendix A)	impervious acres disconnected	40% runoff volume reduction for treated area	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	40	0.00	0.00	0.00	0.00	0.00	
<b>3. Permeable Pavement</b>															<b>3. Permeable Pavement</b>					
3.a. Permeable Pavement #1 (Spec #7)	acres of permeable pavement + acres of "general" (irrigated) impervious pavement	45% runoff volume reduction	0.45	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00	0.00	
3.b. Permeable Pavement #2 (Spec #7)	acres of permeable pavement	75% runoff volume reduction	0.75	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00	0.00	
<b>4. Grass Channel</b>															<b>4. Grass Channel</b>					
4.a. Grass Channel A/B Soils (Spec #3)	impervious acres draining to grass channel	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to grass channel	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00	0.00	
4.b. Grass Channel C/D Soils (Spec #3)	impervious acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00	0.00	
4.c. Grass Channel with Compacted Amend Soils as per Spec #6 (See Spec #4)	impervious acres draining to grass channels	30% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to grass channels	30% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	20	0.00	0.00	0.00	0.00	0.00	
<b>5. Dry Swale</b>															<b>5. Dry Swale</b>					
5.a. Dry Swale #1 (Spec #15)	impervious acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00	0.00	25	0.00	0.00	0.00	0.00	0.00	
5.b. Dry Swale #2 (Spec #10)	impervious acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00	0.00	35	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00	0.00	35	0.00	0.00	0.00	0.00	0.00	
<b>6. Bioretention</b>															<b>6. Bioretention</b>					
6.a. Bioretention #1 (Urban Bioretention) (Spec #6)	impervious acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	40	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	40	0.00	0.00	0.00	0.00	0.00	
6.b. Bioretention #2 (Spec #9)	impervious acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00	0.00	60	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00	0.00	60	0.00	0.00	0.00	0.00	0.00	
<b>7. Infiltration</b>															<b>7. Infiltration</b>					
7.a. Infiltration #1 (Spec #6)	impervious acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00	0.00	
7.b. Infiltration #2 (Spec #8)	impervious acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00	0.00	15	0.00	0.00	0.00	0.00	0.00	
<b>8. Extended Detention Pond</b>															<b>8. Extended Detention Pond</b>					
8.a. ED #1 (Spec #15)	impervious acres draining to ED	10% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	10	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to ED	10% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	10	0.00	0.00	0.00	0.00	0.00	
8.b. ED #2 (Spec #15)	impervious acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	10	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00	0.00	10	0.00	0.00	0.00	0.00	0.00	
<b>9. Sheetflow to Filter/Open Space</b>															<b>9. Sheetflow to Conservation Area or Filter Strip</b>					
9.a. Sheetflow to Conservation Area with A/B Soils (Spec #2)	impervious acres draining to conserved open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to conserved open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
9.b. Sheetflow to Conservation Area with C/D Soils (Spec #2)	impervious acres draining to conserved open space	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to conserved open space	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
9.c. Sheetflow to Vegetated Filter Strip in A/S or Compacted G-C Soil Sols (Spec #2 & 4)	impervious acres draining to filter strip	50% runoff reduction volume	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
	surf acres draining to filter strip	50% runoff reduction volume	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	
	Total IMPERVIOUS COVER TREATED (ac)																			
	TOTAL TURF AREA TREATED (ac)																			
	AREA CHECK (A)																			
	TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/w)	34.13																		
	TOTAL RUNOFF REDUCTION IN D.A. (cf)	0																		
	PHOSPHORUS REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/w)	0.00																		
	TOTAL RUNOFF REDUCTION IN D.A. (cf)	0																		
	NITROGEN REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/w)	0.00																		
	SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS				</td															



Site Results		D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	18.31		0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	18.31		0.00	0.00	0.00	0.00	OK.
TURF AREA	12.28		0.00	0.00	0.00	0.00	OK.
TURF AREA TREATED	12.28		0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	OK.	
<b>Phosphorus</b>							
TOTAL TREATMENT VOLUME (cf)	74,286						
TOTAL PHOSPHORUS LOAD REDUCTION REQUIRED (LB/YEAR)	34.13						
RUNOFF REDUCTION (cf)	0						
PHOSPHORUS LOAD REDUCTION ACHIEVED (LB/YR)	20.98						
ADJUSTED POST-DEVELOPMENT PHOSPHORUS LOAD (TP) (lb/yr)	25.69						
REMAINING PHOSPHORUS LOAD REDUCTION (LB/YR) NEEDED	13.15						
<b>Nitrogen (for information purposes)</b>							
TOTAL TREATMENT VOLUME (cf)	74,286						
RUNOFF REDUCTION (cf)	0						
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	66.70						
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TN) (lb/yr)	267.19						

## Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

**Site Data Summary**

Total Rainfall = 43 inches

**Site Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	12.28	12.28	40.14
Impervious (acres)	0.00	0.00	0.00	18.31	18.31	59.86
					30.59	100.00

Site Rv	0.67
Post Development Treatment Volume (ft <sup>3</sup> )	74286
Post Development TP Load (lb/yr)	46.67
Post Development TN Load (lb/yr)	333.90
Total TP Load Reduction Required (lb/yr)	34.13

Total Runoff Volume Reduction (ft <sup>3</sup> )	0
Total TP Load Reduction Achieved (lb/yr)	21
Total TN Load Reduction Achieved (lb/yr)	66.70
Adjusted Post Development TP Load (lb/yr)	25.69
Remaining Phosphorous Load Reduction (lb/yr) Required	13.15

**Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	12.28	0.00	0.00	0.00	0.00	12.28
Impervious (acres)	18.31	0.00	0.00	0.00	0.00	18.31
						30.59

**Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	20.98	0.00	0.00	0.00	0.00	20.98
TN Load Red. (lb/yr)	66.70	0.00	0.00	0.00	0.00	66.70

**Drainage Area A Summary****Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	12.28	12.28	40.14
Impervious (acres)	0.00	0.00	0.00	18.31	18.31	59.86
					30.59	

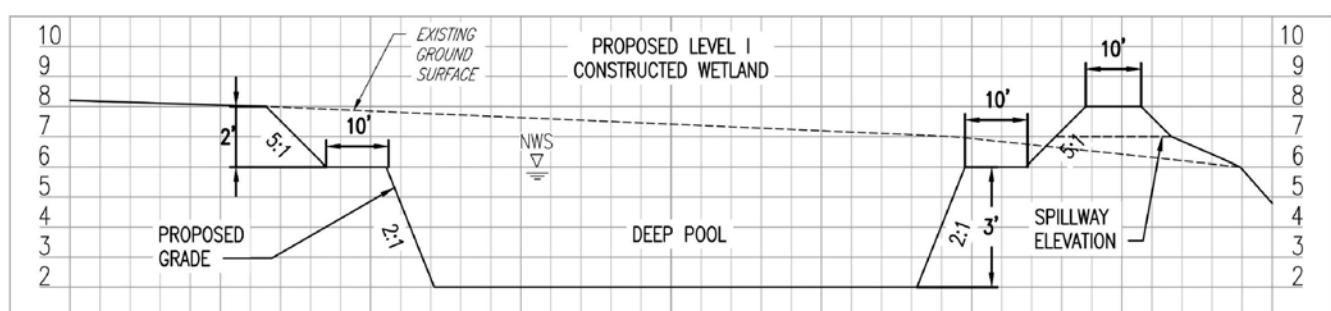
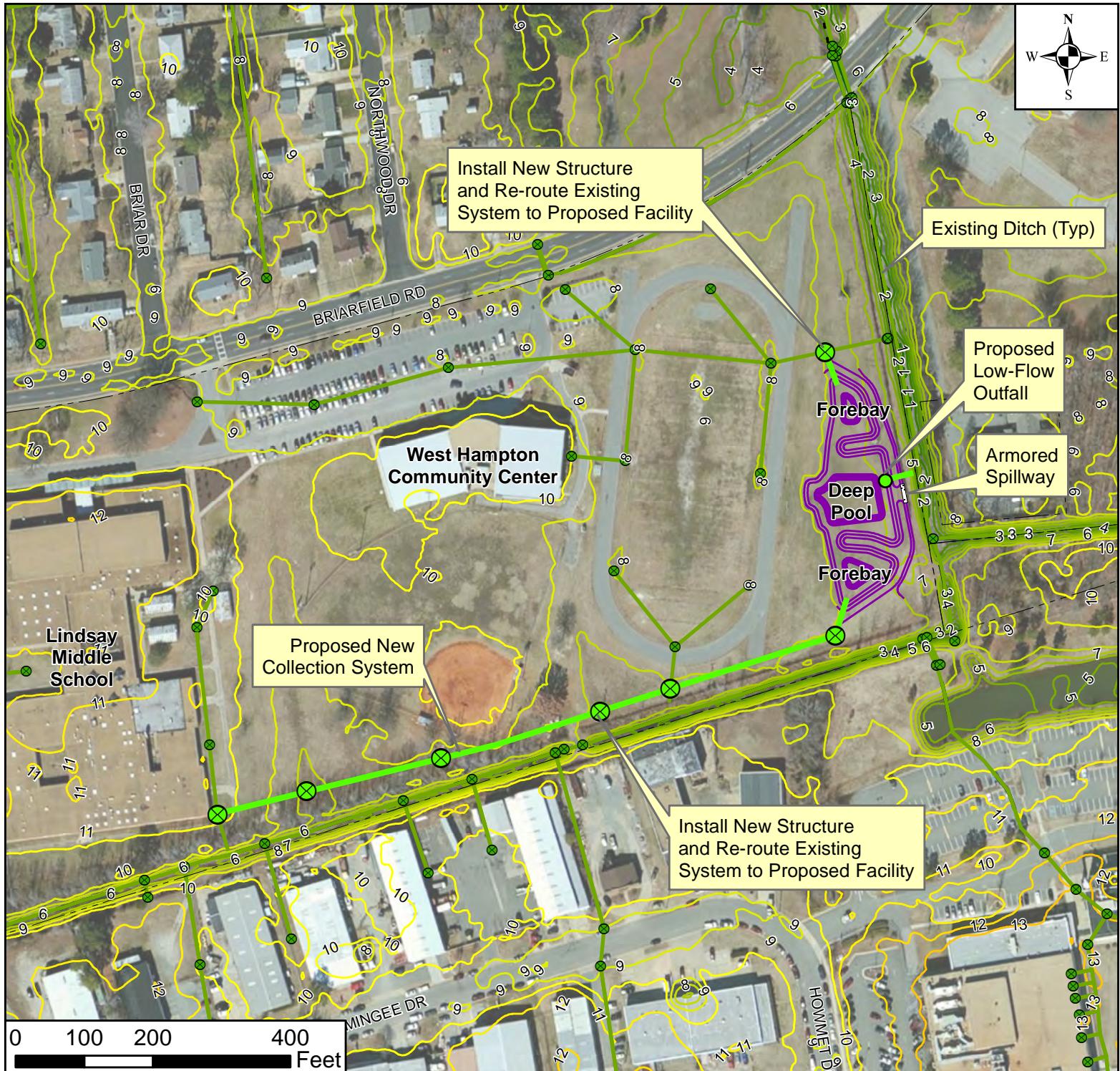
**BMP Selections**

Practice	Credit Area (acres)		Downstream Practice
12.a.Constructed Wetland #1 (Spec #13)	Impervious:	3.49	

Total Impervious Cover Treated (acres)	18.31
Total Turf Area Treated (acres)	12.28
Total TP Load Reduction Achieved in D.A. A (lb/yr)	20.98
Total TN Load Reduction Achieved in D.A. A (lb/yr)	66.70

**Channel and Flood Protection**

	Weighted CN	1-year storm Adjusted CN	2-year storm Adjusted CN	10-year storm Adjusted CN
Target Rainfall Event (in)		0.00	0.00	0.00
D.A. A CN	91	100	100	100
D.A. B CN	0	100	100	100
D.A. C CN	0	100	100	100
D.A. D CN	0	100	100	100
D.A. E CN	0	100	100	100



Typical Cross-Section - N.T.S.

**Location E: Lindsay Middle School & West Hampton Community Center Level I Constructed Wetland**

## **Location E: Lindsay Middle School & West Hampton Community Center**

### **Existing Condition**

Lindsay Middle School and the West Hampton Community Center share City of Hampton owned parcels located at 1636 and 1638 Briarfield Road in Hampton, VA. The 26.3 acre site (31.9% impervious) includes the facility buildings, parking lots, tennis courts, a baseball field, and a track/football field. There are currently no stormwater quantity/quality control measures onsite. However, there is a large tidal ditch along the southern and eastern property lines which the majority of the site drains to. There are five (5) existing storm systems collecting drainage onsite, four (4) of which drain directly to the tidal ditch and the fifth system drains, on the western side of the property. This 5<sup>th</sup> system crosses Briarfield Road and discharges to a creek through a system between Thornbriar Court and Glenrock Drive. Approximately 20.3 acres (25.9% impervious) from the site discharges to the tidal ditch and the remaining 6 acres (52.1% impervious) drains to the western system. The project area is located in a Chesapeake Bay Resource Protection Area. This property is located within an AE flood hazard zones; additionally there is a 0.2 percent annual chance of flood hazard for part of the site. There are no known or visible archeological sites, historical sites or other similar cultural resources located on this site.

### **Proposed Work**

A Level 1 Constructed Wetland facility is proposed at this location. The facility will treat approximately 16.3 acres (32.8% impervious), achieving a phosphorus removal of 8.91 lbs per year. Three of the existing systems entering the tidal ditch will need to be intercepted and directed to the proposed facility, then outfall back into the tidal ditch near the southeast corner of the property. Total Project costs are \$399,000, which equates to a cost per pound of phosphorus removal of \$44,800.

Work associated with constructing the proposed facility includes mostly excavation and shaping/grading operations. Diversions of the existing storm systems are proposed to divert water to the facility; including the installation of a new storm pipe system on the southern boundary of the property to intersect and divert flows currently discharging directly to the tidal ditch along the property line.

The NRCS soils survey shows soils within the proposed project area are a composition of Altavista-Urban Land Complex, Augusta-Urban Land Complex and Tomotley-Urban Land Complex. A preliminary soils investigation in the area of the proposed work confirmed the findings of the NRCS soil survey and confirmed that the soils and water table are suitable for constructing a wetland treatment cell.

### **Limitations**

1. The invert of the low flow discharge will need to be set above mean high tide within the ditch.
2. The current information about the onsite storm pipe systems is incomplete so preliminary survey work will need to be performed. The elevations within our proposed facility are subject to change when the invert of the existing system are identified.
3. A new storm system comprised of approximately 1000 LF new pipe with numerous inlet structures will need to be installed to intercept the southern storm systems.
4. Additional screening measures may need to be installed for student safety.

### **Items of Interest**

1. The proposed stormwater facilities may achieve an additional 4.46 lbs of removal if a Level 2 facility can be constructed.

## **Location E Project Summary**

1. Site Description: Lindsay Middle School & West Hampton Community Center
2. Proposed Facility: Level I Constructed Wetland
3. Latitude: 37.018423°
4. Longitude: -76.396007°
5. Total Drainage Area: 16.30 acres
6. % Impervious: 32.8%
7. Total Nitrogen Removal: 31.88 lb N/year
8. Total Phosphorus Removal: 8.91 lb P/year
9. Total Suspended Solids Removal: 2,838.92 lb SS/year
10. Total Cost: \$399,000
11. Cost per lb P: \$44,800/lb P

Briarfield Watershed Study				
Location 'E' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 26,086	1.00	LS	\$ 26,086.25
<b>Site Preparation</b>				
Abandon Existing Piping	\$ 15	160.00	LF	\$ 2,400
staging and storage area	\$ 4,500	1.00	EA	\$ 4,500
<b>Earthwork</b>				
Topsoil (strip, stockpile, regrade)	\$ 5,000	1.75	AC	\$ 8,750
Shaping and Fine Grading	\$ 5,000	1.00	AC	\$ 5,000
Wetlands Plants & Landscaping	\$ 6,500	1.00	LS	\$ 6,500
Excavation and dispose offsite	\$ 20	7500.00	CY	\$ 150,000
<b>Structures</b>				
Outfall Structure & Piping	\$ 3,500	1.00	EA	\$ 3,500
End Section	\$ 750	2.00	EA	\$ 1,500
24" RCP	\$ 45	1000.00	LF	\$ 45,000
30" RCP	\$ 55	75.00	LF	\$ 4,125
New Structures	\$ 3,500	7.00	EA	\$ 24,500
Class A1 RR	\$ 100	30.00	TN	\$ 3,000
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	1.00	EA	\$ 3,000
Temporary Silt Fence	\$ 3	1500.00	LF	\$ 4,500
Tree Protection	\$ 5	300.00	LF	\$ 1,500
Dewatering	\$ 5,000	1.00	LS	\$ 5,000
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	1.75	AC	\$ 1,750
Fertilizer	\$ 500	1.00	LS	\$ 500
General Stabilization seed mix	\$ 3,500	1.75	AC	\$ 6,125
<b>Subtotal Materials</b>				<b>\$ 281,150</b>
<b>SUBTOTAL= subtotal materials plus mobilization</b>				<b>\$ 307,236</b>
Design Fee				\$ 61,447
10% Contingency				\$ 30,724
<b>Construction (2016 \$)</b>				<b>\$ 399,000</b>
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				

Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014					
To be used w/ 2011 BMP Standards and Specifications					
Site Data					
Project Name: Briarfield Watershed Study - Location E - Lindsay Middle School					
Date: February 2016					
<b>1. Post-Development Project &amp; Land Cover Information</b>					
Constants					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26		Nitrogen EMC (mg/L)	1.86	
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				
Land Cover (acres)					
	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	10.97	10.97
Impervious Cover (acres)	0.00	0.00	0.00	5.35	5.35
			Total		16.32
Rv Coefficients					
	A soils	B Soils	C Soils	D Soils	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
Land Cover Summary					
Forest/Open Space Cover (acres)	0.00				
Weighted Rv(forest)	0.00				
% Forest	0%				
Managed Turf Cover (acres)	10.97				
Weighted Rv(turf)	0.25				
% Managed Turf	67%				
Impervious Cover (acres)	5.35				
Rv(impermeable)	0.95				
% Impermeable	33%				
<b>Total Site Area (acres)</b>	16.32				
<b>Site Rv</b>	0.48				
Post-Development Treatment Volume (acre-ft)	0.65				
Post-Development Treatment Volume (cubic feet)	28,405				
Post_Development Load (TP) (lb/yr)	17.85	Post_Development Load (TN) (lb/yr)	127.67		
Total Load (TP) Reduction Required (lb/yr)	11.16				

Drainage Area A																		
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream RR Practice (cf)	Rainfall Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Load from Upstream RR Practices (lbs.)	Phosphorus Load to Practice (lbs.)	Phosphorus Removed By Practice (lbs.)	Remaining Phosphorus Load (lbs.)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Upstream RR Practices (lbs.)	Estimated Nitrogen Load to Practice (lbs.)	Effluent Removed By Practice (lbs.)	Remaining Nitrogen Load (lbs.)
1. Vegetated Roof														1. Green Roof				
1.a. Vegetated Roof #1 (Spec #6)	acres of green roof	45% runoff volume reduction	0.45	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
1.b. Vegetated Roof #2 (Spec #5)	acres of green roof	65% runoff volume reduction	0.60	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2. Rooftop Disconnection														2. Impervious Surface Disconnection				
2.a. Simple Disconnection to A/B Soils (Spec #1)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.b. Simple Disconnection to C/D Soils (Spec #1)	impervious acres disconnected	25% runoff volume reduction for treated area	0.25	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.c. To Soil Amended Filter Path as per Specification #4	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.d. To Dry Well or French Drain #1 (Specification #1 Spec #6)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
2.e. To Dry Well or French Drain #2 (Specification #2 Spec #8)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
2.f. To Rain Garden #1 (Micro-Bioswale) (Spec #6)	impervious acres disconnected	40% runoff capture	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
2.g. To Rain Garden #2 (Macro-Bioswale) (Spec #9)	impervious acres disconnected	40% runoff capture for treated area	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		60	0.00	0.00	0.00	0.00
2.h. To Rainwater Harvesting (Spec #6)	impervious acres captured	Spec #6	0.00	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.i. To Stormwater Planter (Urban Biofiltration) (Spec #9 Appendix A)	impervious acres disconnected	40% runoff volume reduction for treated area	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
3. Permeable Pavement														3. Permeable Pavement				
3.a. Permeable Pavement #1 (Spec #7)	acres of permeable pavement + acres of "general" (irrigated) impervious pavement	45% runoff volume reduction	0.45	0.00	0	0	0	25	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
3.b. Permeable Pavement #2 (Spec #7)	acres of permeable pavement	75% runoff volume reduction	0.75	0.00	0	0	0	25	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
4. Grass Channel														4. Grass Channel				
4.a. Grass Channel A/B Soils (Spec #3)	impervious acres draining to grass channels	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
	turf acres draining to grass channels	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
4.b. Grass Channel C/D Soils (Spec #3)	impervious acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
	turf acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
4.c. Grass Channel with Compact Amended Soils as per specs (See Spec #4)	impervious acres draining to grass channels	30% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
	turf acres draining to grass channels	30% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
5. Dry Swale														5. Dry Swale				
5.a. Dry Swale #1 (Spec #10)	impervious acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
	turf acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
5.b. Dry Swale #2 (Spec #10)	impervious acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
	turf acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
6. Bioretention														6. Bioretention				
6.a. Bioretention #1 (Urban Bioretention) (Spec #6)	impervious acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
	turf acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
6.b. Bioretention #2 (Spec #9)	impervious acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		60	0.00	0.00	0.00	0.00
	turf acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		60	0.00	0.00	0.00	0.00
7. Infiltration														7. Infiltration				
7.a. Infiltration #1 (Spec #6)	impervious acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
	turf acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
7.b. Infiltration #2 (Spec #8)	impervious acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
	turf acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
8. Extended Detention Pond														8. Extended Detention Pond				
8.a. ED #1 (Spec #15)	impervious acres draining to ED	10% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
	turf acres draining to ED	10% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
8.b. ED #2 (Spec #15)	impervious acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
	turf acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
9. Sheetflow to Filter/Open Space														9. Sheetflow to Conservation Area or Filter Strip				
9.a. Sheetflow to Conservation Area with A/B Soils (Spec #2)	impervious acres draining to conserved open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
	turf acres draining to conserved open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
9.b. Sheetflow to Conservation Area with C/D Soils (Spec #2)	impervious acres draining to conserved open space	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
	turf acres draining to conserved open space	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
9.c. Sheetflow to Vegetated Filter Strip in A Soils or Coarse Grained Soils (Spec #2 & 4)	impervious acres draining to filter strip	50% runoff reduction volume for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
	turf acres draining to filter strip	50% runoff reduction volume for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
	TOTAL IMPERVIOUS COVER TREATED (ac)	0.00																
	TOTAL TURF AREA TREATED (ac)	0.00																
	AREA CHECK (ac)																	
	TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	11.16																
	TOTAL RUNOFF REDUCTION IN D.A. (cf)	0																
	PHOSPHORUS REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/yr)	0.00																
	TOTAL RUNOFF REDUCTION IN D.A. (cf)	0																
	NITROGEN REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/yr)	0.00																
	SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS																	
Apply Practices that Remove Pollutants but Do Not Reduce Runoff Volume																		
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream RR Practice (cf)	Rainfall Reduction (cf)	Remaining Runoff (cf)	Phosphorus Efficiency (%)	Load from Upstream RR Practices (lbs.)	Phosphorus Load to Practice (lbs.)	Phosphorus Removed By Practice (lbs.)	Remaining Phosphorus Load (lbs.)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Upstream RR Practices (lbs.)	Estimated Nitrogen Load to Practice (lbs.)	Effluent Removed By Practice (lbs.)	Remaining Nitrogen Load (lbs.)
10. Wet Swales (Coastal Plain)													10. Wet Swales (Coastal Plain)					
	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
10.a. Wet Swale #1 (Spec #11)	wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
10.b. Wet Swale #2 (Spec #11)	wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
11. Filtering Practices													11. Filtering Practices					
	impervious acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	0.00	0.00		30	0.00	0.00	0.00	0.00
11.a. Filtering Practice #1 (Spec #12)	filter	0% runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	0.00	0.00		30	0.00	0.00	0.00	0.00
	impervious acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	65	0.00	0.00	0.00	0.00		45	0.00	0.00	0.00	0.00
11.b. Filtering Practice #2 (Spec #12)	filter	0% runoff volume reduction	0.00	0.00	0	0	0	65	0.00	0.00	0.00	0.00		45	0.00	0.00	0.00	0.00</



Site Results		D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	5.35	0.00	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	5.35	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA	10.97	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA TREATED	10.97	0.00	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	OK.	
<b>Phosphorus</b>							
TOTAL TREATMENT VOLUME (cf)	<b>28,405</b>						
TOTAL PHOSPHORUS LOAD REDUCTION REQUIRED (LB/YEAR)	<b>11.16</b>						
RUNOFF REDUCTION (cf)	0						
PHOSPHORUS LOAD REDUCTION ACHIEVED (LB/YR)	<b>8.91</b>						
ADJUSTED POST-DEVELOPMENT PHOSPHORUS LOAD (TP) (lb/yr)	<b>8.93</b>						
REMAINING PHOSPHORUS LOAD REDUCTION (LB/YR) NEEDED	<b>2.24</b>						
<b>Nitrogen (for information purposes)</b>							
TOTAL TREATMENT VOLUME (cf)	<b>28,405</b>						
RUNOFF REDUCTION (cf)	0						
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	<b>31.88</b>						
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TN) (lb/yr)	<b>95.79</b>						

## Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

**Site Data Summary**

Total Rainfall = 43 inches

**Site Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	10.97	10.97	67.22
Impervious (acres)	0.00	0.00	0.00	5.35	5.35	32.78
					16.32	100.00

Site Rv	0.48
Post Development Treatment Volume (ft <sup>3</sup> )	28405
Post Development TP Load (lb/yr)	17.85
Post Development TN Load (lb/yr)	127.67
Total TP Load Reduction Required (lb/yr)	11.16

Total Runoff Volume Reduction (ft <sup>3</sup> )	0
Total TP Load Reduction Achieved (lb/yr)	9
Total TN Load Reduction Achieved (lb/yr)	31.88
Adjusted Post Development TP Load (lb/yr)	8.93
Remaining Phosphorous Load Reduction (lb/yr) Required	2.24

**Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	10.97	0.00	0.00	0.00	0.00	10.97
Impervious (acres)	5.35	0.00	0.00	0.00	0.00	5.35
						16.32

**Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	8.91	0.00	0.00	0.00	0.00	8.91
TN Load Red. (lb/yr)	31.88	0.00	0.00	0.00	0.00	31.88

**Drainage Area A Summary**Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	10.97	10.97	67.22
Impervious (acres)	0.00	0.00	0.00	5.35	5.35	32.78
					16.32	

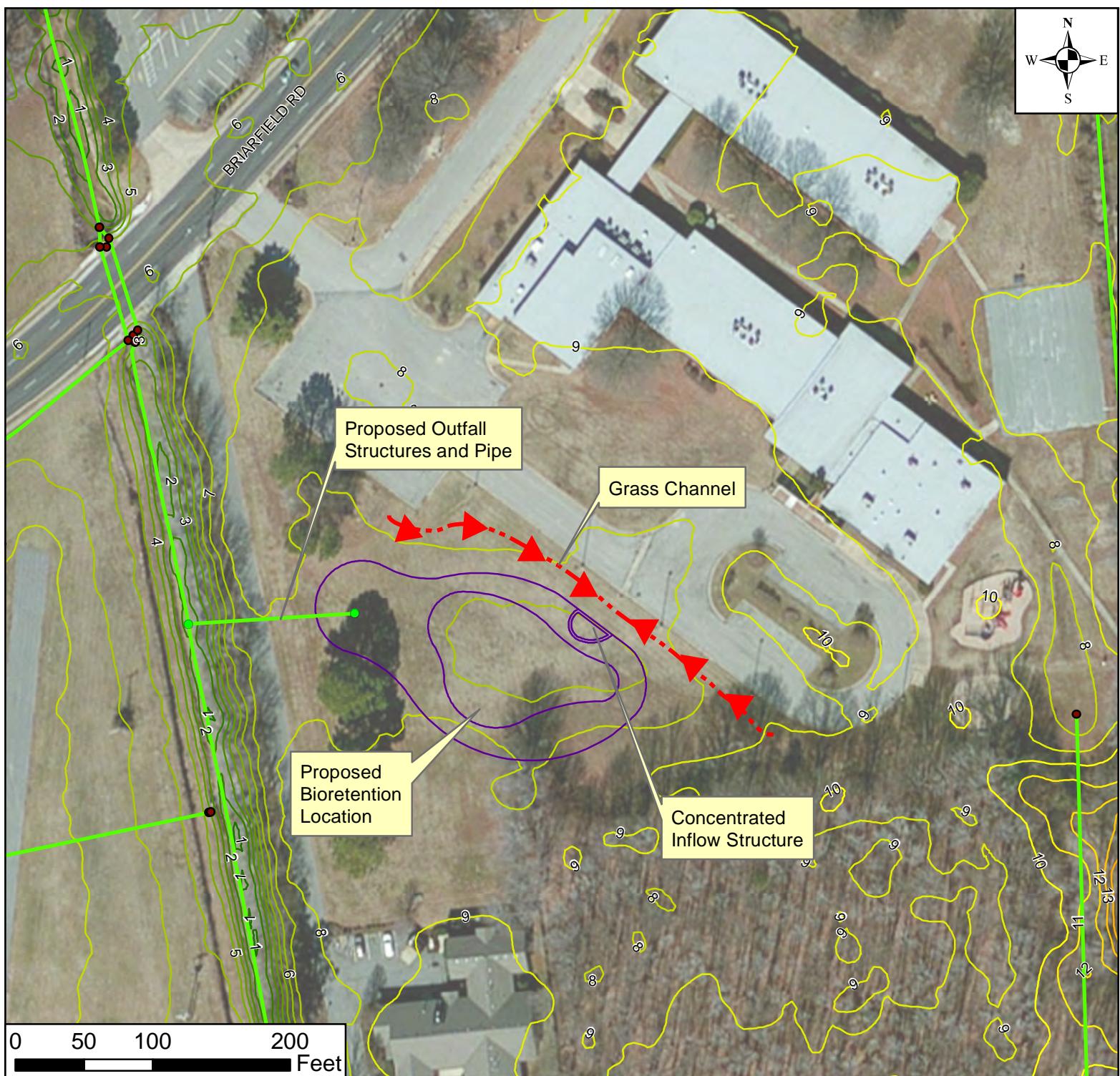
BMP Selections

Practice	Credit Area (acres)		Downstream Practice
12.a.Constructed Wetland #1 (Spec #13)	Impervious:	3.49	

Total Impervious Cover Treated (acres)	5.35
Total Turf Area Treated (acres)	10.97
Total TP Load Reduction Achieved in D.A. A (lb/yr)	8.91
Total TN Load Reduction Achieved in D.A. A (lb/yr)	31.88

**Channel and Flood Protection**

	Weighted CN	1-year storm Adjusted CN	2-year storm Adjusted CN	10-year storm Adjusted CN
Target Rainfall Event (in)		0.00	0.00	0.00
D.A. A CN	86	100	100	100
D.A. B CN	0	100	100	100
D.A. C CN	0	100	100	100
D.A. D CN	0	100	100	100
D.A. E CN	0	100	100	100



Typical Cross-Section - N.T.S.

**Location F: Robert E. Lee Elementary School Level I Bioretention**

## **Location F: Robert E. Lee Elementary School**

### **Existing Condition**

Robert E. Lee Elementary School is located between Lindsay Middle School and the Powhatan Park subdivision off of Briarfield Road in Hampton, VA. There are currently no stormwater quantity/quality control measures onsite; however, there is large tidal ditch on the west perimeter of the elementary school. The tidal ditch currently collects drainage from an estimated 14 acres (3% impervious) City of Hampton owned parcel, directs drainage across Briarfield Road and discharges into Newmarket Creek. Although, site reconnaissance confirms stormwater inlets on the elementary school property, surveyed information for the stormwater structures and pipelines are currently not available.

The project area is located within a Chesapeake Bay Resource Protection Area. This property is located within a 0.2 percent annual chance of flood; additionally, the tidal ditch is an AE flood hazard zones. There are no known or visible archeological sites, historical sites or other similar cultural resources located on this site.

### **Proposed Work**

A level 1 bioretention basin, approximately 0.23 acres in size, is proposed to treat stormwater drainage. The proposed facility will treat 6.37 acres (52% impervious) of the school site, achieving a phosphorus removal of 4.90 lbs per year. Total Project costs are estimated to be \$267,000, which equates to a cost for phosphorus removal of approximately \$54,500 per pound.

Work associated with the installation of the bioretention basin includes excavation and grading operations, all bioretention facility materials, including but not limited to soil media and underdrains, landscaping and plantings, the installation of a grass swale to divert surface flow runoff to the facility and modifying the existing storm pipe system to divert flows to the new facility. The water table in the proposed location was evaluated and preliminary findings suggest that the water table is deep enough and combined with the depth of the existing adjacent outfall ditch there appears to be enough depth to install a level 1 bio-retention facility.

The NRCS soils survey shows soils within the proposed project area are a composition of Altavista-Urban Land Complex, Augusta-Urban Land Complex and Tomotley-Urban Land Complex. A preliminary soils investigation in the area for the proposed work confirmed the findings of the NRCS soil survey. Although the in-situ soils are not ideal for the level of infiltration needed for bioretention, the use of an underdrain in the facility will adequately drain the facility, addressing lower infiltration rates.

### **Limitations**

1. The current GIS information for the onsite storm systems is limited. Prior to final design a topographical survey will need to be performed to ensure accuracy for the proposed facility.

### **Items of Interest**

1. The proposed stormwater facilities may achieve an additional removal credit of 3.12 lbs pounds per year if a Level 2 bioretention basin can be constructed.

## **Location F Project Summary**

1. Site Description: Robert E. Lee Elementary School
2. Proposed Facility: Level I Bioretention Basin
3. Latitude: 37.019547°
4. Longitude: -76.395095°
5. Total Drainage Area: 6.37 acres
6. % Impervious: 52.0%
7. Total Nitrogen Removal: 63.71 lb N/year
8. Total Phosphorus Removal: 4.90 lb P/year
9. Total Suspended Solids Removal: 1,614.87 lb SS/year
10. Total Cost: \$267,000
11. Cost per lb P: \$54,500/lb P

Briarfield Watershed Study				
Location 'F' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 17,325	1.00	LS	\$ 17,325
<b>Site Preparation</b>				
Abandon Existing Piping	\$ 20	160.00	LF	\$ 3,200
Staging and Storage Area	\$ 4,500	1.00	EA	\$ 4,500
<b>Earthwork</b>				
Topsoil (strip, stockpile, regrade)	\$ 5,000	1.75	AC	\$ 8,750
Shaping and Fine Grading	\$ 5,000	1.00	AC	\$ 5,000
Bioretention Plants & Landscaping	\$ 6,500	1.00	LS	\$ 6,500
Excavation and dispose offsite	\$ 20	3500.00	CY	\$ 70,000
Bioretention Soil Media (incl. mulch)	\$ 45	835.00	CY	\$ 37,575
57 stone	\$ 35	35.00	TON	\$ 1,225
Pea Gravel (incl. filter fabric)	\$ 90	75.00	CY	\$ 6,750
<b>Structures</b>				
New Inflow Structure	\$ 3,500	1.00	EA	\$ 3,500
Class A1 RR	\$ 100	30.00	TN	\$ 3,000
New Outfall structure and pipe	\$ 3,500	1.00	EA	\$ 3,500
6" Sch. 40 PVC Underdrains	\$ 1,000	1.00	LS	\$ 1,000
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	1.00	EA	\$ 3,000
Temporary Silt Fence	\$ 3	1000.00	LF	\$ 3,000
Tree Protection	\$ 5	400.00	LF	\$ 2,000
Dewatering	\$ 7,500	1.00	LS	\$ 7,500
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	1.00	AC	\$ 1,000
Fertilizer	\$ 500	1.00	LS	\$ 500
General Stabilization seed mix	\$ 3,500	0.50	AC	\$ 1,750
<b>Subtotal Materials</b>				\$ 173,250
<b>SUBTOTAL= subtotal materials plus mobilization</b>				\$ 190,575
Design Fee				\$ 57,173
10% Contingency				\$ 19,058
<b>Construction (2016 \$)</b>				\$ 267,000
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				

Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014					
To be used w/ 2011 BMP Standards and Specifications					
Site Data					
Project Name: Briarfield Watershed Study - Location F - Robert E. Lee Elementary School					
Date: February 2016					
<b>1. Post-Development Project &amp; Land Cover Information</b>					
<b>Constants</b>					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26		Nitrogen EMC (mg/L)	1.86	
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				
<b>Land Cover (acres)</b>					
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	<b>Totals</b>
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	3.06	3.06
Impervious Cover (acres)	0.00	0.00	0.00	3.31	3.31
				<b>Total</b>	6.37
<b>Rv Coefficients</b>					
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
<b>Land Cover Summary</b>					
Forest/Open Space Cover (acres)	0.00				
Weighted Rv(forest)	0.00				
% Forest	0%				
Managed Turf Cover (acres)	3.06				
Weighted Rv(turf)	0.25				
% Managed Turf	48%				
Impervious Cover (acres)	3.31				
Rv(impermeous)	0.95				
% Impermeous	52%				
<b>Total Site Area (acres)</b>	6.37				
<b>Site Rv</b>	0.61				
Post-Development Treatment Volume (acre-ft)	0.33				
Post-Development Treatment Volume (cubic feet)	14,191				
Post_Development Load (TP) (lb/yr)	8.92	Post_Development Load (TN) (lb/yr)	63.79		
Total Load (TP) Reduction Required (lb/yr)	6.30				

Drainage Area A																				
Drainage Area A Land Cover (acres)	A soils	B Soils	C Soils	D Soils	Total															
Forest/Open Space (acres)	0.00	0.00	0.00	0.00	0.00															
Managed Turf (acres)	0.00	0.00	0.00	3.06	3.06															
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00															
	Total				6.97															
Apply Runoff Reduction Practices to Reduce Treatment Volume & Post-Development Load in Drainage Area A																				
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Pre-Practice (cf)	Volume from Post-Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Load from Pre-Practice (lbs)	Unreated Phosphorus Efficiency (%)	Phosphorus Load from Post-Practice (lbs)	Remaining Phosphorus Load (lbs)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Pre-Practice (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed by Practice (lbs)	Remaining Nitrogen Load (lbs)		
1. Vegetated Roof																				
1.a. Vegetated Roof #1 (Spec#1)	acres of green roof	40% runoff volume reduction	0.45	0.00	0	0	0	0	0.00	0.00	0.00	0.00		1. Green Roof	0	0.00	0.00	0.00		
1.b. Vegetated Roof #2 (Spec #5)	acres of green roof	80% runoff volume reduction	0.60	0.00	0	0	0	0	0.00	0.00	0.00	0.00		1. Green Roof	0	0.00	0.00	0.00		
2. Road Disconnection																				
2.a. Simple Disconnection to A/B Soils (Spec #3)	impervious acres disconnected	50% runoff volume reduction	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	0	0.00	0.00	0.00		
2.b. Simple Disconnection to C/D Soils (Spec #3)	impervious acres disconnected	25% runoff volume reduction for treated area	0.25	0.00	0	0	0	0	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	0	0.00	0.00	0.00		
2.c. To Soil Amended Filter Path as per practices (excluding CD soils) (Spec #4)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	0	0.00	0.00	0.00		
2.d. To Dry Well or French Drain #2 (Micro-Bermed) (Spec #3)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	15	0.00	0.00	0.00		
2.e. To Dry Well or French Drain #1 (Micro-Bermed) (Spec #3)	impervious acres disconnected	90% runoff volume reduction for treated area	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	15	0.00	0.00	0.00		
2.f. To Rain Garden #1 (Micro-Bermed) (Spec #3)	impervious acres disconnected	40% of volume captured	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	40	0.00	0.00	0.00		
2.g. To Rain Garden #2 (Micro-Bermed) (Spec #3)	impervious acres disconnected	80% runoff volume reduction for treated area	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	60	0.00	0.00	0.00		
2.h. To Rainwater Harvesting (Spec #6)	impervious acres captured	based on tank size and design of harvested (See Spec. See Spec. #6)	0.00	0.00	0	0	0	0	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	0	0.00	0.00	0.00		
2.i. To Stormwater Planter (Urban) (Spec #3)	impervious acres disconnected	40% runoff volume reduction for treated area	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		2. Impervious Surface Disconnection	40	0.00	0.00	0.00		
3. Permeable Pavement																				
3.a. Permeable Pavement #1 (Spec #7)	acres of permeable pavement + areas where infiltration is required	40% runoff volume reduction	0.45	0.00	0	0	0	25	0.00	0.00	0.00	0.00		3. Permeable Pavement	25	0.00	0.00	0.00		
3.b. Permeable Pavement #2 (Spec #7)	acres of permeable pavement	75% runoff volume reduction	0.75	0.00	0	0	0	25	0.00	0.00	0.00	0.00		3. Permeable Pavement	25	0.00	0.00	0.00		
4. Grass Channel																				
4.a. Grass Channel A/B Soils (Spec #3)	impervious acres draining to grass channels	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00		4. Grass Channel	20	0.00	0.00	0.00		
4.b. Grass Channel C/D Soils (Spec #3)	turf acres draining to grass channels	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00		4. Grass Channel	20	0.00	0.00	0.00		
4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4)	impervious acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00		4. Grass Channel	20	0.00	0.00	0.00		
4.d. Grass Channel with Compost Amended Soils as per specs (see Spec #4)	turf acres draining to grass channels	10% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00		4. Grass Channel	20	0.00	0.00	0.00		
5. Dry Swale																				
5.a. Dry Swale #1 (Spec #10)	impervious acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00		5. Dry Swale	25	0.00	0.00	0.00		
5.b. Dry Swale #2 (Spec #10)	turf acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00		5. Dry Swale	25	0.00	0.00	0.00		
5.c. Dry Swale #3 (Spec #10)	impervious acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00		5. Dry Swale	35	0.00	0.00	0.00		
5.d. Dry Swale #4 (Spec #10)	turf acres draining to dry swale	60% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00		5. Dry Swale	35	0.00	0.00	0.00		
6. Bioretention																				
6.a. Bioretention #1 or Urban Bioretention (Spec #9)	impervious acres draining to bioretention	40% runoff volume reduction	0.40	3.11	0	4566	6840	25	0.00	7.16	3.94	3.22		6. Bioretention	40	0.00	51.25	22.80	18.45	
6.b. Bioretention #2 (Spec #9)	turf acres draining to bioretention	40% runoff volume reduction	0.40	3.06	0	1111	1666	25	0.00	1.74	0.96	0.78		6. Bioretention	40	0.00	12.47	7.98	4.49	
6.c. Bioretention #2 (Spec #9)	impervious acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		6. Bioretention	60	0.00	0.00	0.00	0.00	
6.d. Bioretention #2 (Spec #9)	turf acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		6. Bioretention	60	0.00	0.00	0.00	0.00	
7. Infiltration																				
7.a. Infiltration #1 (Spec #8)	impervious acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		7. Infiltration	15	0.00	0.00	0.00	0.00	
7.b. Infiltration #2 (Spec #8)	turf acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		7. Infiltration	15	0.00	0.00	0.00	0.00	
7.c. Infiltration #2 (Spec #8)	impervious acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00		7. Infiltration	15	0.00	0.00	0.00	0.00	
7.d. Infiltration #2 (Spec #8)	turf acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00		7. Infiltration	15	0.00	0.00	0.00	0.00	
8. Extended Detention Pond																				
8.a. ED #1 (Spec #15)	impervious acres draining to ED	0% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00		8. Extended Detention Pond	10	0.00	0.00	0.00	0.00	
8.b. ED #2 (Spec #15)	turf acres draining to ED	0% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00		8. Extended Detention Pond	10	0.00	0.00	0.00	0.00	
8.c. ED #2 (Spec #15)	impervious acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00		8. Extended Detention Pond	10	0.00	0.00	0.00	0.00	
8.d. ED #2 (Spec #15)	turf acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00		8. Extended Detention Pond	10	0.00	0.00	0.00	0.00	
9. Sheetflow to Filter/Open Space																				
9.a. Sheetflow to Conservation Area with A/B Soils (Spec #2)	impervious acres draining to open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00		9. Sheetflow to Filter Strip	0	0.00	0.00	0.00	0.00	
9.b. Sheetflow to Conservation Area with A/B Soils (Spec #2)	turf acres draining to open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00		9. Sheetflow to Filter Strip	0	0.00	0.00	0.00	0.00	
9.c. Sheetflow to Conservation Area with C/D Soils (Spec #2)	impervious acres draining to open space	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		9. Sheetflow to Filter Strip	0	0.00	0.00	0.00	0.00	
9.d. Sheetflow to Conservation Area with C/D Soils (Spec #2)	turf acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		9. Sheetflow to Filter Strip	0	0.00	0.00	0.00	0.00	
9.e. Sheetflow to Filter Open Space (Spec #2 & #4)	impervious acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		9. Sheetflow to Filter Strip	0	0.00	0.00	0.00	0.00	
9.f. Sheetflow to Filter Open Space (Spec #2 & #4)	turf acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		9. Sheetflow to Filter Strip	0	0.00	0.00	0.00	0.00	
TOTAL IMPERVIOUS COVER TREATED (ac)																				
TOTAL TURF AREA TREATED (ac)																				
AREA CHECK OK																				
TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)																				
5.677																				
TOTAL RUNOFF REDUCTION IN D.A. (lb/yr)																				
5.677																				
PHOSPHORUS REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/yr)																				
5.677																				
SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS																				
Apply Practices that Remove Pollutants but Do Not Reduce Runoff Volume																				
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Pre-Practice (cf)	Volume from Post-Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Load from Pre-Practice (lbs)	Unreated Phosphorus Efficiency (%)	Phosphorus Load from Post-Practice (lbs)	Remaining Phosphorus Load (lbs)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Pre-Practice (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed by Practice (lbs)	Remaining Nitrogen Load (lbs)		
10. Wet Swale (Coastal Plain)																				
10.a. Wet Swale #1 (Spec #11)	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00		10. Wet Swale (Coastal Plain)	25	0.00	0.00	0.00	0.00	
10.b. Wet Swale #2 (Spec #11)	turf acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00		10. Wet Swale (Coastal Plain)	25	0.00	0.00	0.00	0.00	
10.c. Wet Swale #1 (Spec #11)	impervious acres draining to wet swale	25% runoff volume reduction	0.25	0.00	0	0	0	40	0.00	0.00	0.00	0.00		10. Wet Swale (Coastal Plain)	35	0.00	0.00	0.00	0.00	
10.d. Wet Swale #2 (Spec #11)	turf acres draining to wet swale	25% runoff volume reduction	0.25	0.00	0	0	0	40	0.00	0.00	0.00	0.00		10. Wet Swale (Coastal Plain)	35	0.00	0.00	0.00	0.00	
11. Filtering Practices																				
11.a. Filter Practice #1 (Spec #12)	impervious acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	0.00	0.00								



Site Results		D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	3.31	0.00	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	3.31	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA	3.06	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA TREATED	3.06	0.00	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	OK.	
<b>Phosphorus</b>							
TOTAL TREATMENT VOLUME (cf)	14,191						
TOTAL PHOSPHORUS LOAD REDUCTION REQUIRED (LB/YEAR)	6.30						
RUNOFF REDUCTION (cf)	5677						
PHOSPHORUS LOAD REDUCTION ACHIEVED (LB/YR)	4.90						
ADJUSTED POST-DEVELOPMENT PHOSPHORUS LOAD (TP) (lb/yr)	4.02						
REMAINING PHOSPHORUS LOAD REDUCTION (LB/YR) NEEDED	1.41						
<b>Nitrogen (for information purposes)</b>							
TOTAL TREATMENT VOLUME (cf)	14,191						
RUNOFF REDUCTION (cf)	5677						
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	63.71						
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TN) (lb/yr)	0.07						

## Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

**Site Data Summary**

Total Rainfall = 43 inches

**Site Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	3.06	3.06	48.04
Impervious (acres)	0.00	0.00	0.00	3.31	3.31	51.96
					6.37	100.00

Site Rv	0.61
Post Development Treatment Volume (ft <sup>3</sup> )	14191
Post Development TP Load (lb/yr)	8.92
Post Development TN Load (lb/yr)	63.79
Total TP Load Reduction Required (lb/yr)	6.30

Total Runoff Volume Reduction (ft <sup>3</sup> )	5677
Total TP Load Reduction Achieved (lb/yr)	5
Total TN Load Reduction Achieved (lb/yr)	63.71
Adjusted Post Development TP Load (lb/yr)	4.02
Remaining Phosphorous Load Reduction (lb/yr) Required	1.41

**Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	3.06	0.00	0.00	0.00	0.00	3.06
Impervious (acres)	3.31	0.00	0.00	0.00	0.00	3.31
						6.37

**Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	4.90	0.00	0.00	0.00	0.00	4.90
TN Load Red. (lb/yr)	63.71	0.00	0.00	0.00	0.00	63.71

**Drainage Area A Summary****Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	3.06	3.06	48.04
Impervious (acres)	0.00	0.00	0.00	3.31	3.31	51.96
					6.37	

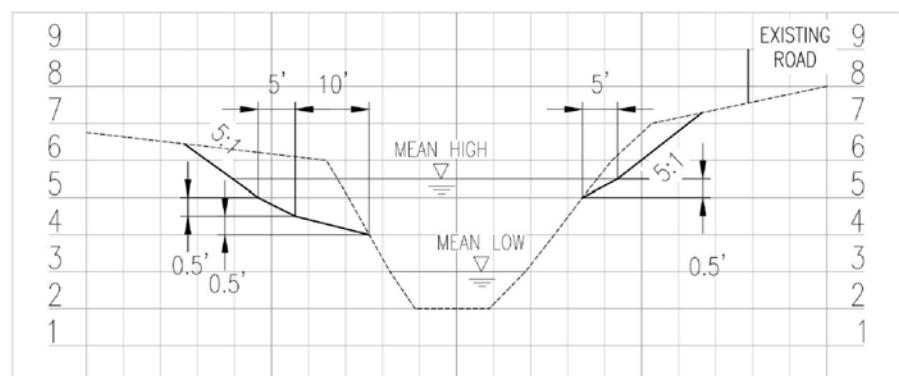
**BMP Selections**

Practice	Credit Area (acres)		Downstream Practice
12.a.Constructed Wetland #1 (Spec #13)	Impervious:	3.49	

Total Impervious Cover Treated (acres)	3.31
Total Turf Area Treated (acres)	3.06
Total TP Load Reduction Achieved in D.A. A (lb/yr)	4.90
Total TN Load Reduction Achieved in D.A. A (lb/yr)	63.71

**Channel and Flood Protection**

	Weighted CN	1-year storm Adjusted CN	2-year storm Adjusted CN	10-year storm Adjusted CN
Target Rainfall Event (in)		0.00	0.00	0.00
D.A. A CN	89	#N/A	#N/A	#N/A
D.A. B CN	0	100	100	100
D.A. C CN	0	100	100	100
D.A. D CN	0	100	100	100
D.A. E CN	0	100	100	100



Typical Cross-Section - N.T.S.

## Location G: Tidal Ditch Improvements

## **Location G: Tidal Ditch Improvements**

### **Existing Condition**

There is a network of tidal influenced ditches that convey runoff from approximately 342 acres (51.1% impervious) in the Briarfield watershed between Hwy I 664 and Newmarket Creek. The section of tidal drainage ditch being considered for improvements is 2300 linear feet beginning at the southeastern property boundary of Lindsay Middle School and West Hampton Community Center and ending on the upstream side of a large culvert crossing underneath Briarfield Road. The project area is located in a Chesapeake Bay Resource Protection Area. This property is located within an AE flood hazard zone; additionally there is a 0.2 percent annual chance of flood hazard for a portion of the site. There are no known or visible archeological sites, historical sites or other similar cultural resources located on this site.

### **Proposed Work**

Due to the ditch being tidally influenced it is not eligible for standard Chesapeake Bay Clearinghouse BMP phosphorus removal credits. It is however a prime candidate for the credit for protocol 3 "Sedimentation" as described in the *Recommendations of the Expert Panel to Define Removal Rates for Shoreline Management Projects*; which is a guidelines document prepared by an expert panel on shoreline restorations and approved by DEQ. The regulations state that under the sedimentation protocol projects are eligible for 5.289 lb pounds/acre of wetlands established/year of phosphorus removal credit. This proposed design of the tidal ditch improvements along with the shoreline restoration will achieve a 5.58 pounds per rear of phosphorus removal. Total project costs are \$266,000, which equates to a cost per pound for phosphorus removal of \$47,700.

Phosphorus removal credit will be achieved through the creation of approximately 1.06 acres of tidally influenced wetlands. Vegetated wetland shelves 5 to 10 foot wide will be formed with elevation offsets between shelves at a minimum of 6". This will allow each shelf to become inundated at various depths and duration within the tidal cycle to allow the establishment of a variation of wetland types.

The NRCS soils survey shows soils within the proposed project area to be a composition of Tomotley-Urban Land Complex and urban land. A preliminary soils investigation was not conducted in the area of the proposed work to confirm the NRCS soils survey, however the composition of soils provided in the soils survey as well as the known tidal influence appears to be adequate to construct tidal wetlands.

### **Limitations**

1. There is limited space to expand the ditch to the south and eastern side, therefore the conversion will take place on the Lindsay Middle School/West Hampton Community Center side.
2. Site reconnaissance confirms downstream flooding within site.

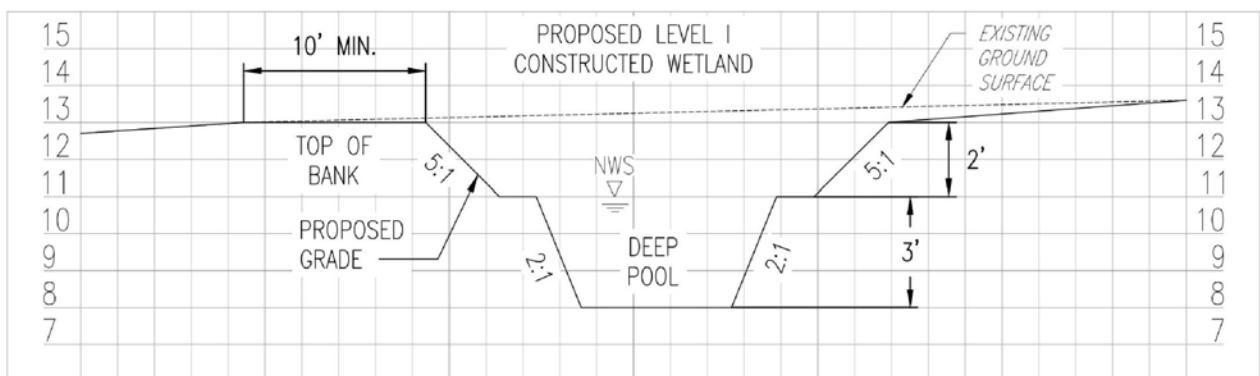
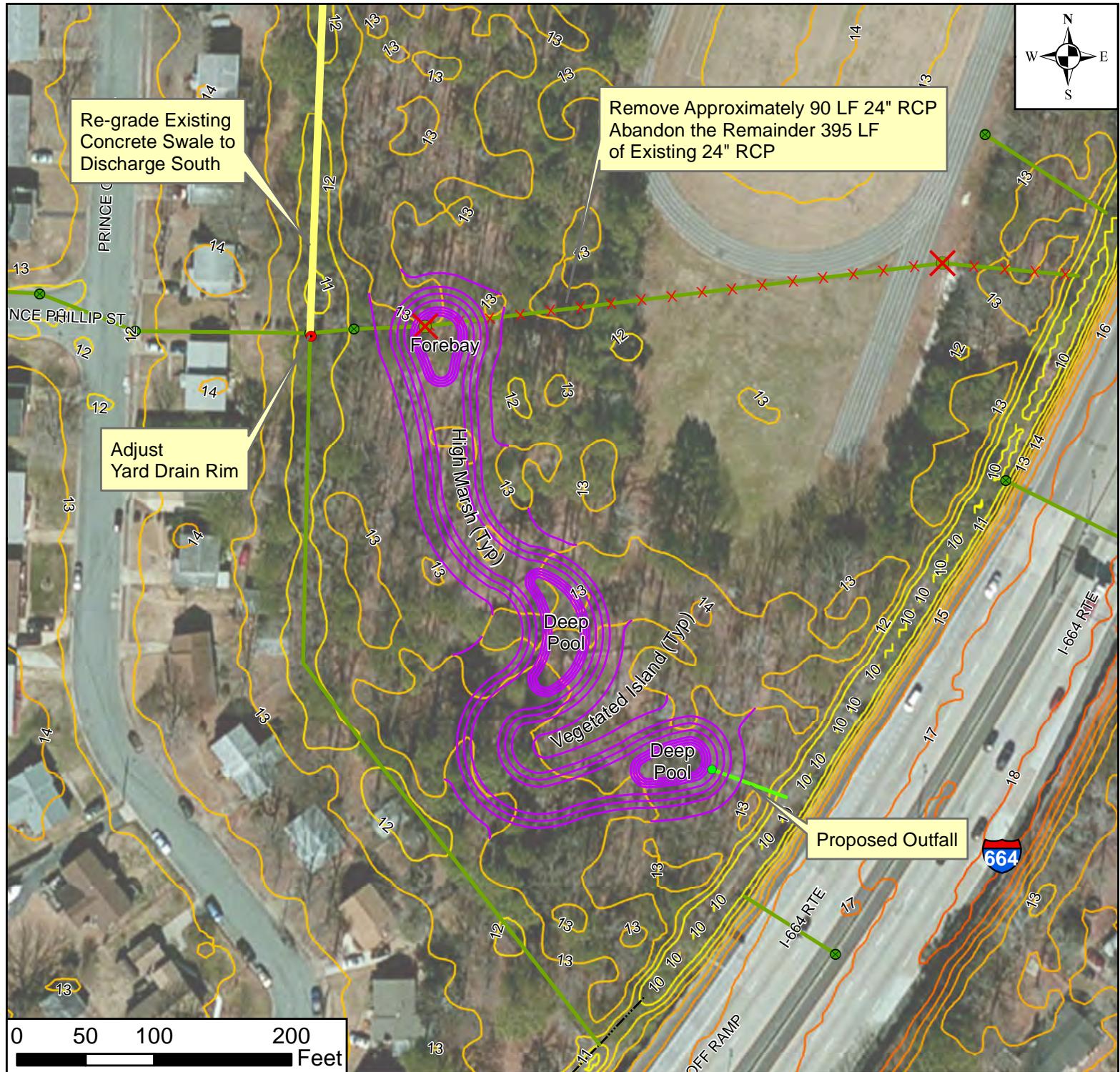
### **Items of Interest**

1. There are several design concepts to be considered for this project, the following phosphorus removals should be considered in the final design:  
A 10' wide section will achieve a phosphorus removal credit of 2.793 pounds of phosphorus per year.

## **Location G Project Summary**

1. Site Description: Tidal Ditch Improvements
2. Proposed Facility: Shoreline Management Sedimentation (Constructed Tidal Wetlands)
3. Latitude: 37.019354°
4. Longitude: -76.395836°
5. Total Drainage Area: 342.0 acres
6. % Impervious: 51.1%
7. Area of Wetlands Created: 1.06 acres
8. Total Nitrogen Removal: N/A
9. Total Phosphorus Removal: 5.584 lb P/year
10. Total Suspended Solids Removal: 7,347.15 lb SS/year
11. Total Cost: \$266,000
12. Cost per lb P: \$47,700/lb P

Briarfield Watershed Study				
Location 'G' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 17,790	1.00	LS	\$ 17,790
<b>Site Preparation</b>				
Staging and Storage Area	\$ 3,500	1.00	EA	\$ 3,500
Clearing and Grubbing	\$ 7,500	2.25	AC	\$ 16,875
<b>Earthwork</b>				
Excavation and dispose offsite	\$ 20	3000.00	CY	\$ 60,000
Topsoil (strip, stockpile, regrade)	\$ 5,000	2.50	AC	\$ 12,500
Shaping and Fine Grading	\$ 5,000	2.50	AC	\$ 12,500
Wetlands Plants & Landscaping	\$ 15,000	1.00	LS	\$ 15,000
<b>Structures</b>				
Class A1 RR	\$ 100	200.00	TN	\$ 20,000
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	2.00	EA	\$ 6,000
Temporary Silt Fence	\$ 3	4800.00	LF	\$ 14,400
Tree Protection	\$ 5	300.00	LF	\$ 1,500
Dewatering	\$ 5,000	1.00	LS	\$ 5,000
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	2.25	AC	\$ 2,250
Fertilizer	\$ 500	1.00	LS	\$ 500
General Stabilization seed mix	\$ 3,500	2.25	AC	\$ 7,875
<b>Subtotal Materials</b>				<b>\$ 177,900</b>
<b>SUBTOTAL= subtotal materials plus mobilization</b>				<b>\$ 195,690</b>
Design Fee				\$ 50,879
10% Contingency				\$ 19,569
<b>Construction (2016 \$)</b>				<b>\$ 266,000</b>
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				



Typical Cross-Section - N.T.S.

**Location H: Hampton High School Level I Constructed Wetland**

## **Location H: Hampton High School**

### **Existing Conditions**

Hampton High School is located within the Hampton Terrace district of the Briarfield Watershed in Hampton, VA. The City of Hampton owned parcel is 26.6 acres which includes Hampton High School athletic grounds including a running track and baseball fields. Additionally there are 21.5 acres to the west of which some area drains to Queen Street and some drains across the southern portion of the property into an existing roadside ditch along I-664.

There are currently no stormwater quantity/quality control measures on site; however, there are conveyance systems within the neighborhood to the west and on the perimeter of the school site. Interstate 664 borders the East side of the Hampton High School property with a parallel drainage ditch. A stormwater system is collecting half of the adjacent neighborhood drainage, conveying the stormwater in a closed pipe system across the school site and discharging into the concrete swale west of the campus.

This project area is not located within a Chesapeake Bay Resource Protection Area. Hampton High School is located within the X flood hazard zone; therefore, the property is higher than the elevation of the 0.2 percent annual chance flood. A review of recorded historical and cultural resources reveals there is no known cultural or historical resource located on the property.

### **Proposed Work**

A level I constructed wetland, approximately 3 acres in size, will be installed on site south of the athletic grounds in an existing wooded area. The new facility will outfall to the drainage ditch paralleling I-664. The proposed facility will treat approximately 48 acres (35.3% impervious), achieving a phosphorus removal of 41.84 lbs per year. Total Project costs are \$700,000, which equates to a cost per pound for phosphorus removal of \$16,800.

Work associated with constructing the proposed facility includes approximately 3 acres of clearing behind the school and existing storm pipe system modifications to divert stormwater to the proposed facilities. An existing concrete swale on the western side of the property will be re-graded to divert flow towards the facility. Landscaping and excavation are also major components of constructing the proposed stormwater facility.

The NRCS soil survey shows soils within the proposed project area are a composition of Altavista-Urban Land Complex, Tomotley-Urban Land Complex and Udorthents-Dumps Complex. A preliminary soils investigation in the area of the proposed work confirmed the findings of the NRCS soils survey and showed that the soils were suitable for constructing a wetland feature.

### **Limitations**

1. The level 1 constructed wetland requires the removal of approximately 3 acres of an existing wooded area.
2. A setback of 25 feet from the track and a 15 foot maintenance area will be required around the new facility.
3. Reconstruction of the existing concrete swale will require coordination with home owners.

## **Items of Interest**

1. The proposed facility may achieve a phosphorus removal credit of 62.77 lbs per year, an additional 20.93 lbs per year, if the facility can be upgraded to a Level II Constructed Wetland. Physical constraints will have to be surveyed and detailed in order to make a determination.

## **Location H Project Summary**

1. Site Description: Hampton High School
2. Proposed Facility: Level I Constructed Wetland
3. Latitude: 37.019742°
4. Longitude: -76.384157°
5. Total Drainage Area: 48.0 acres
6. % Impervious: 35.3%
7. Total Nitrogen Removal: 149.67 lb N/year
8. Total Phosphorus Removal: 41.84 lb P/year
9. Total Suspended Solids Removal: 12,432.98 lb SS/year
10. Total Cost: \$700,000
11. Cost per lb P: \$16,800/lb P

Briarfield Watershed Study				
Location 'H' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 42,225	1.00	LS	\$ 42,224.75
<b>Site Preparation</b>				
Remove existing 24" RCP	\$ 30	160.00	EA	\$ 4,800
Remove concrete swale	\$ 15	3166.00	EA	\$ 47,490
Clearing and Grubbing	\$ 7,500	3.00	AC	\$ 22,500
Staging and Storage Area	\$ 5,000	1.00	LS	\$ 5,000
<b>Earthwork</b>				
Excavation and dispose offsite	\$ 20	14000.00	CY	\$ 280,000
Topsoil (strip, stockpile, regrade)	\$ 5,000	3.00	AC	\$ 15,000
Shaping and Fine Grading	\$ 5,000	3.00	AC	\$ 15,000
Wetlands Plants & Landscaping	\$ 12,000	1.00	LS	\$ 12,000
<b>Structures</b>				
Outfall Structure & Piping	\$ 4,500	1.00	EA	\$ 4,500
Install new 24" RCP	\$ 48	50.00	LF	\$ 2,400
Install concrete swale	\$ 15	3166.00	LF	\$ 47,490
VDOT DI-1	\$ 3,500	1.00	EA	\$ 3,500
Class A1 RR	\$ 55	30.00	TN	\$ 1,650
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	2.00	EA	\$ 6,000
Temporary Silt Fence	\$ 3	2000.00	LF	\$ 6,000
Tree Protection	\$ 5	600.00	LF	\$ 3,000
Dewatering	\$ 5,000	2.00	LS	\$ 10,000
Traffic Control	\$ 4,500	1.00	LS	\$ 4,500
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	1.00	AC	\$ 1,000
Fertilizer	\$ 500	2.00	LS	\$ 1,000
General Stabilization seed mix	\$ 3,500	1.00	AC	\$ 3,500
<b>Subtotal Materials</b>				\$ 496,330
<b>SUBTOTAL= subtotal materials plus mobilization</b>				\$ 538,555
Design Fee				\$ 107,711
10% Contingency				\$ 53,855
<b>Construction (2016 \$)</b>				\$ 700,000
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				

Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014					
To be used w/ 2011 BMP Standards and Specifications					
<b>Site Data</b>					
Project Name: Briarfield Watershed Study - Location H - Hampton High School					
Date: February 2016					
<b>1. Post-Development Project &amp; Land Cover Information</b>					
<b>Constants</b>					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26			Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				
<b>Land Cover (acres)</b>					
	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	12.80	12.80
Impervious Cover (acres)	0.00	0.00	0.00	35.30	35.30
				Total	48.10
<b>Rv Coefficients</b>					
	A soils	B Soils	C Soils	D Soils	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
<b>Land Cover Summary</b>					
Forest/Open Space Cover (acres)	0.00				
Weighted Rv(forest)	0.00				
% Forest	0%				
Managed Turf Cover (acres)	12.80				
Weighted Rv(turf)	0.25				
% Managed Turf	27%				
Impervious Cover (acres)	35.30				
Rv(imperVIOUS)	0.95				
% ImperVIOUS	73%				
<b>Total Site Area (acres)</b>	48.10				
<b>Site Rv</b>	0.76				
Post-Development Treatment Volume (acre-ft)	3.06				
Post-Development Treatment Volume (cubic feet)	133,348				
Post_Development Load (TP) (lb/yr)	83.78	Post_Development Load (TN) (lb/yr)	599.37		
Total Load (TP) Reduction Required (lb/yr)	64.06				

Drainage Area A																		
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream RR Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Upstream RR Practices (bs.)	Upstream Load to Practice (bs.)	Phosphorus Removed By Practice (bs.)	Remaining Phosphorus Load (bs.)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Upstream RR Practices (bs.)	Estimated Nitrogen Load to Practice (bs.)	Effluent Removed By Practice (bs.)	Remaining Nitrogen Load
1. Vegetated Roof														<b>1. Green Roof</b>				
1.a. Vegetated Roof #1 (Spec #6)	acres of green roof	45% runoff volume reduction	0.45	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
1.b. Vegetated Roof #2 (Spec #5)	acres of green roof	65% runoff volume reduction	0.60	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2. Rooftop Disconnection														<b>2. Impervious Surface Disconnection</b>				
2.a. Simple Disconnection to A/B Soils (Spec #1)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.b. Simple Disconnection to C/D Soils (Spec #1)	impervious acres disconnected	25% runoff volume reduction for treated area	0.25	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.c. To Soil Amended Filter Path as per Specification #4	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.d. To Dry Well or French Drain #1 (Specification #1)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
2.e. To Dry Well or French Drain #2 (Micro-infiltration #2) (Spec #8)	impervious acres disconnected	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
2.f. To Rain Garden #1 (Micro-Bioswale) (Spec #9)	impervious acres disconnected	40% runoff volume capture	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
2.g. To Rain Garden #2 (Macro-Bioswale) (Spec #9)	impervious acres disconnected	40% runoff volume reduction for treated area	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		60	0.00	0.00	0.00	0.00
2.h. To Rainwater Harvesting (Spec #9)	impervious acres captured	Spec #9	0.00	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
2.i. To Stormwater Planter (Urban Biofiltration) (Spec #9, Appendix A)	impervious acres disconnected	40% runoff volume reduction for treated area	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
3. Permeable Pavement														<b>3. Permeable Pavement</b>				
3.a. Permeable Pavement #1 (Spec #7)	acres of permeable pavement + acres of "general" (impervious) pavement	45% runoff volume reduction	0.45	0.00	0	0	0	25	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
3.b. Permeable Pavement #2 (Spec #7)	acres of permeable pavement	75% runoff volume reduction	0.75	0.00	0	0	0	25	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
4. Grass Channel														<b>4. Grass Channel</b>				
4.a. Grass Channel A/B Soils (Spec #3)	impervious acres draining to grass channel	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
	surf acres draining to grass channel	20% runoff volume reduction	0.20	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
4.b. Grass Channel C/D Soils (Spec #3)	impervious acres draining to grass channels	50% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
	surf acres draining to grass channels	50% runoff volume reduction	0.10	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
4.c. Grass Channel with Compact Amended Soils as per Spec #4 (See Spec #4)	impervious acres draining to grass channels	50% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
	surf acres draining to grass channels	30% runoff volume reduction	0.30	0.00	0	0	0	15	0.00	0.00	0.00	0.00		20	0.00	0.00	0.00	0.00
5. Dry Swale														<b>5. Dry Swale</b>				
5.a. Dry Swale #1 (Spec #10)	impervious acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
	surf acres draining to dry swale	40% runoff volume reduction	0.40	0.00	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
5.b. Dry Swale #2 (Spec #10)	impervious acres draining to dry swale	65% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
	surf acres draining to dry swale	65% runoff volume reduction	0.60	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
6. Bioretention														<b>6. Bioretention</b>				
6.a. Bioretention #1 (Urban Bioretention) (Spec #6)	impervious acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
	surf acres draining to bioretention	40% runoff volume reduction	0.40	0.00	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
6.b. Bioretention #2 (Spec #6)	impervious acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		60	0.00	0.00	0.00	0.00
	surf acres draining to bioretention	80% runoff volume reduction	0.80	0.00	0	0	0	50	0.00	0.00	0.00	0.00		60	0.00	0.00	0.00	0.00
7. Infiltration														<b>7. Infiltration</b>				
7.a. Infiltration #1 (Spec #8)	impervious acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
	surf acres draining to infiltration	50% runoff volume reduction	0.50	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
7.b. Infiltration #2 (Spec #8)	impervious acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
	surf acres draining to infiltration	90% runoff volume reduction	0.90	0.00	0	0	0	25	0.00	0.00	0.00	0.00		15	0.00	0.00	0.00	0.00
8. Extended Detention Pond														<b>8. Extended Detention Pond</b>				
8.a. ED #1 (Spec #15)	impervious acres draining to ED	10% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
	surf acres draining to ED	10% runoff volume reduction	0.00	0.00	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
8.b. ED #2 (Spec #15)	impervious acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
	surf acres draining to ED	15% runoff volume reduction	0.15	0.00	0	0	0	15	0.00	0.00	0.00	0.00		10	0.00	0.00	0.00	0.00
9. Sheetflow to Filter/Open Space														<b>9. Sheetflow to Conservation Area or Filter Strip</b>				
9.a. Sheetflow to Conservation Area with A/B Soils (Spec #2)	impervious acres draining to conserved open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
	surf acres draining to conserved open space	75% runoff volume reduction for treated area	0.75	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
9.b. Sheetflow to Conservation Area with C/D Soils (Spec #2)	impervious acres draining to conserved open space	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
	surf acres draining to conserved open space	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
9.c. Sheetflow to Vegetated Filter Strip in A Soils or Compacted G-Soil Soils (Spec #2 & 4)	impervious acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
	surf acres draining to filter strip	50% runoff volume reduction for treated area	0.50	0.00	0	0	0	0	0.00	0.00	0.00	0.00		0	0.00	0.00	0.00	0.00
		TOTAL IMPERVIOUS COVER TREATED (ac)	0.00															
		TOTAL TURF AREA TREATED (ac)	0.00															
		AREA CHECK OK																
		TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	64,00															
		TOTAL RUNOFF REDUCTION IN D.A. (lb)	0															
		PHOSPHORUS REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/yr)	0.00															
		TOTAL RUNOFF REDUCTION RATE IN D.A. (lb/yr)	0															
		NITROGEN REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/yr)	0.00															
		SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS																
Apply Practices that Remove Pollutants but Do Not Reduce Runoff Volume																		
Practice	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream RR Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Upstream RR Practices (bs.)	Upstream Load to Practice (bs.)	Phosphorus Removed By Practice (bs.)	Remaining Phosphorus Load (bs.)	Downstream Treatment to be Employed	Nitrogen Efficiency (%)	Nitrogen Load from Upstream RR Practices (bs.)	Estimated Nitrogen Load to Practice (bs.)	Effluent Removed By Practice (bs.)	Remaining Nitrogen Load
10. Wet Swales (Coastal Plain)														<b>10. Wet Swales (Coastal Plain)</b>				
10.a. Wet Swale #1 (Spec #11)	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
	surf acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	0.00	0.00		25	0.00	0.00	0.00	0.00
10.b. Wet Swale #1 (Spec #11)	impervious acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
	surf acres draining to wet swale	0% runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	0.00	0.00		35	0.00	0.00	0.00	0.00
11. Filtering Practices														<b>11. Filtering Practices</b>				
11.a. Filtering Practice #1 (Spec #12)	impervious acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	0.00	0.00		30	0.00	0.00	0.00	0.00
	surf acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	0.00	0.00		30	0.00	0.00	0.00	0.00
11.b. Filtering Practice #2 (Spec #12)	impervious acres draining to filter	0% runoff volume reduction	0.00	0.00	0	0	0	65	0.00	0.00	0.00	0.00</						



Site Results						
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	35.30	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	35.30	0.00	0.00	0.00	0.00	OK.
TURF AREA	12.80	0.00	0.00	0.00	0.00	OK.
TURF AREA TREATED	12.80	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	
Phosphorus						
TOTAL TREATMENT VOLUME (cf)	133,348					
TOTAL PHOSPHORUS LOAD REDUCTION REQUIRED (LB/YEAR)	64.06					
RUNOFF REDUCTION (cf)	0					
PHOSPHORUS LOAD REDUCTION ACHIEVED (LB/YR)	41.84					
ADJUSTED POST-DEVELOPMENT PHOSPHORUS LOAD (TP) (lb/yr)	41.94					
REMAINING PHOSPHORUS LOAD REDUCTION (LB/YR) NEEDED	22.22					
Nitrogen (for information purposes)						
TOTAL TREATMENT VOLUME (cf)	133,348					
RUNOFF REDUCTION (cf)	0					
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	149.67					
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TN) (lb/yr)	449.69					

## Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

**Site Data Summary**

Total Rainfall = 43 inches

**Site Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	12.80	12.80	26.61
Impervious (acres)	0.00	0.00	0.00	35.30	35.30	73.39
					48.10	100.00

Site Rv	0.76
Post Development Treatment Volume (ft <sup>3</sup> )	133348
Post Development TP Load (lb/yr)	83.78
Post Development TN Load (lb/yr)	599.37
Total TP Load Reduction Required (lb/yr)	64.06

Total Runoff Volume Reduction (ft <sup>3</sup> )	0
Total TP Load Reduction Achieved (lb/yr)	42
Total TN Load Reduction Achieved (lb/yr)	149.67
Adjusted Post Development TP Load (lb/yr)	41.94
Remaining Phosphorous Load Reduction (lb/yr) Required	22.22

**Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	12.80	0.00	0.00	0.00	0.00	12.80
Impervious (acres)	35.30	0.00	0.00	0.00	0.00	35.30
						48.10

**Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	41.84	0.00	0.00	0.00	0.00	41.84
TN Load Red. (lb/yr)	149.67	0.00	0.00	0.00	0.00	149.67

**Drainage Area A Summary****Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	12.80	12.80	26.61
Impervious (acres)	0.00	0.00	0.00	35.30	35.30	73.39
					48.10	

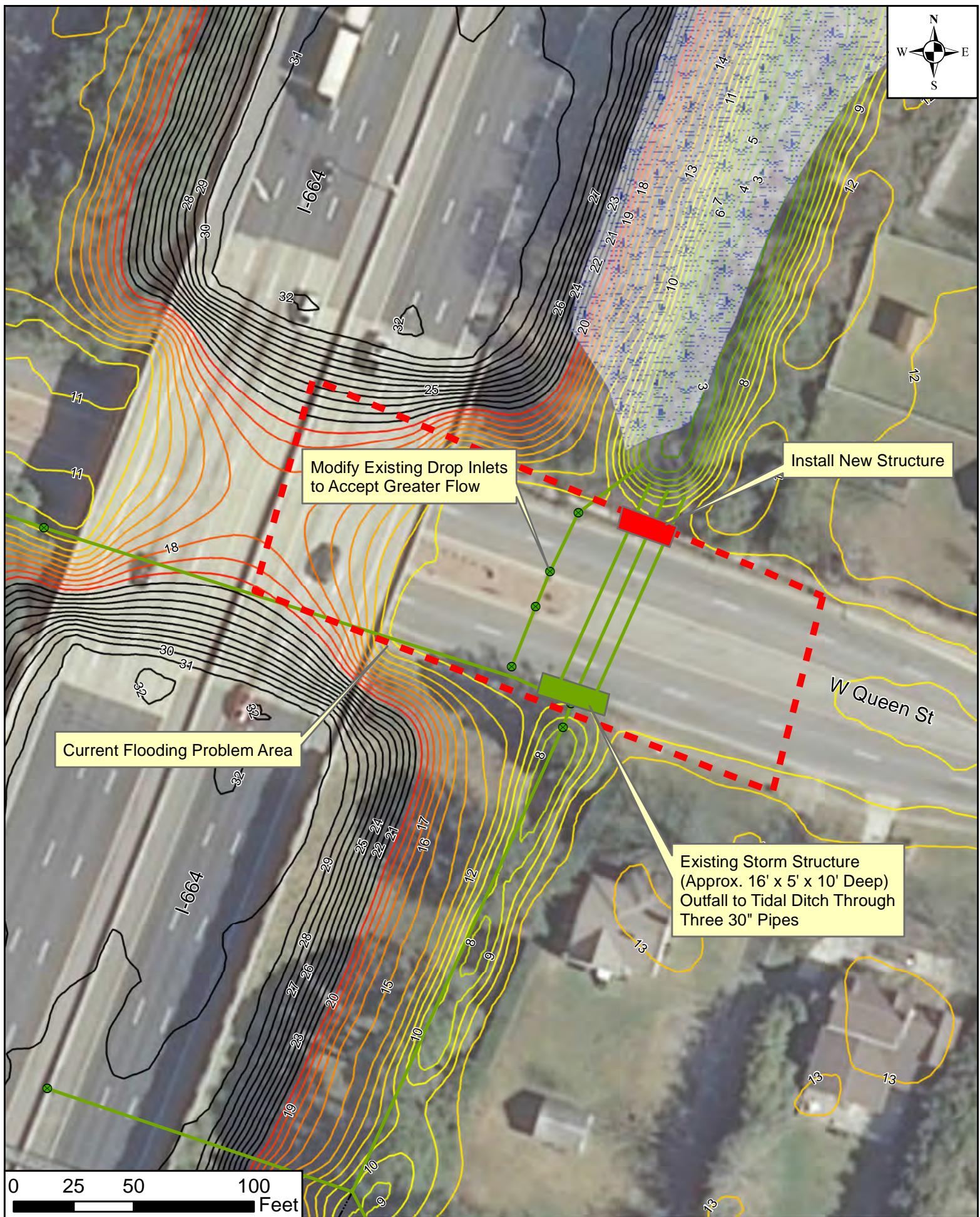
**BMP Selections**

Practice	Credit Area (acres)		Downstream Practice
12.a.Constructed Wetland #1 (Spec #13)	Impervious:	3.49	

Total Impervious Cover Treated (acres)	35.30
Total Turf Area Treated (acres)	12.80
Total TP Load Reduction Achieved in D.A. A (lb/yr)	41.84
Total TN Load Reduction Achieved in D.A. A (lb/yr)	149.67

**Channel and Flood Protection**

	Weighted CN	1-year storm Adjusted CN	2-year storm Adjusted CN	10-year storm Adjusted CN
Target Rainfall Event (in)		0.00	0.00	0.00
D.A. A CN	93	100	100	100
D.A. B CN	0	100	100	100
D.A. C CN	0	100	100	100
D.A. D CN	0	100	100	100
D.A. E CN	0	100	100	100



**Location I: W Queen Street Crossing**

## **Location I: West Queen Street Crossing**

### **Existing Conditions**

Significant flooding currently occurs on West Queen Street at the I-664 overpass. Approximately 5 acres of surface runoff to West Queen Street collects at a low point just east of the overpass. The existing system in this location is not adequately sized to convey stormwater off the road as quickly as necessary. The roadway remains flooded after significant rainfall events as much as 24 hours. Approximately 22 acres (42.4% impervious) passes through the existing storm system which collects drainage from a portion of W Queen St, Hampton High School, I-664, and the neighborhood off of Azalea Drive. Drainage converges at a large structure and discharges to a tidally influenced ditch on the north side of West Queen Street through three 30" pipes. Additionally there is an independent pipe system in place to drain the road at the low point where flooding occurs, however the pipe and inlet systems are undersized. This project area is located within a Chesapeake Bay Resource Protection Area. This property is not located within any flood hazard zones. There are no known or visible archeological sites, historical sites or other similar cultural resources located on this site.

### **Proposed Work**

To help alleviate the current flooding which occurs in this area and to remove standing water off of West Queen Street, the existing independent storm pipe system will be modified to accept additional flow. Additional curb drop inlets and storm pipes will connect to the existing independent system. The pipes in the independent system will be enlarged to pass more intense rainfall events. This project can be completed independently however it should be combined with project J for a more comprehensive solution to water quality and quantity issues.

The NRCS soil survey shows soils within the proposed project area are a composition of Altavista-Urban Land Complex and Udorthents-Dumps Complex. A preliminary soils investigation was not conducted in the area of the proposed work confirmed the findings of the NRCS soils survey.

### **Limitations**

1. Traffic control and pedestrian ingress egress through the work zone will be limited during stormwater upgrades.

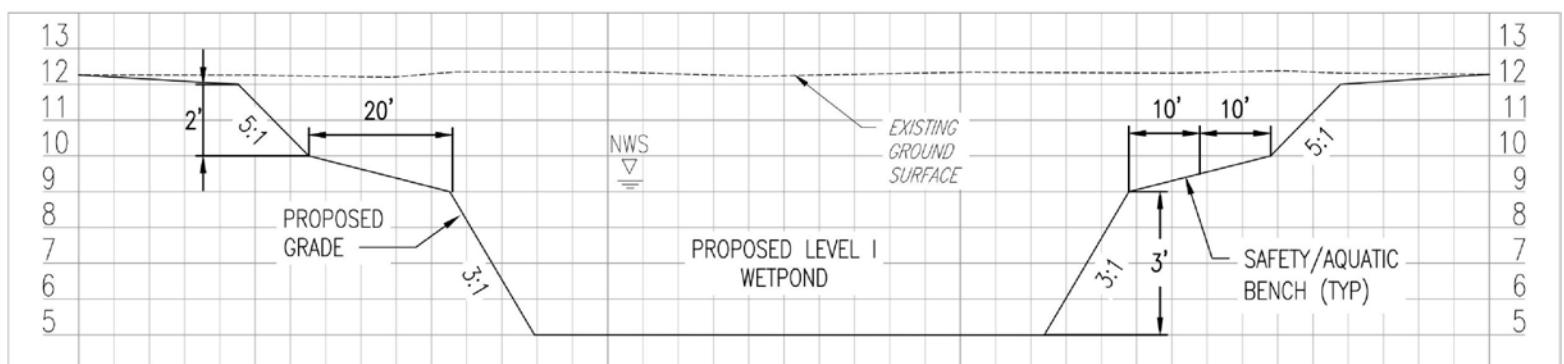
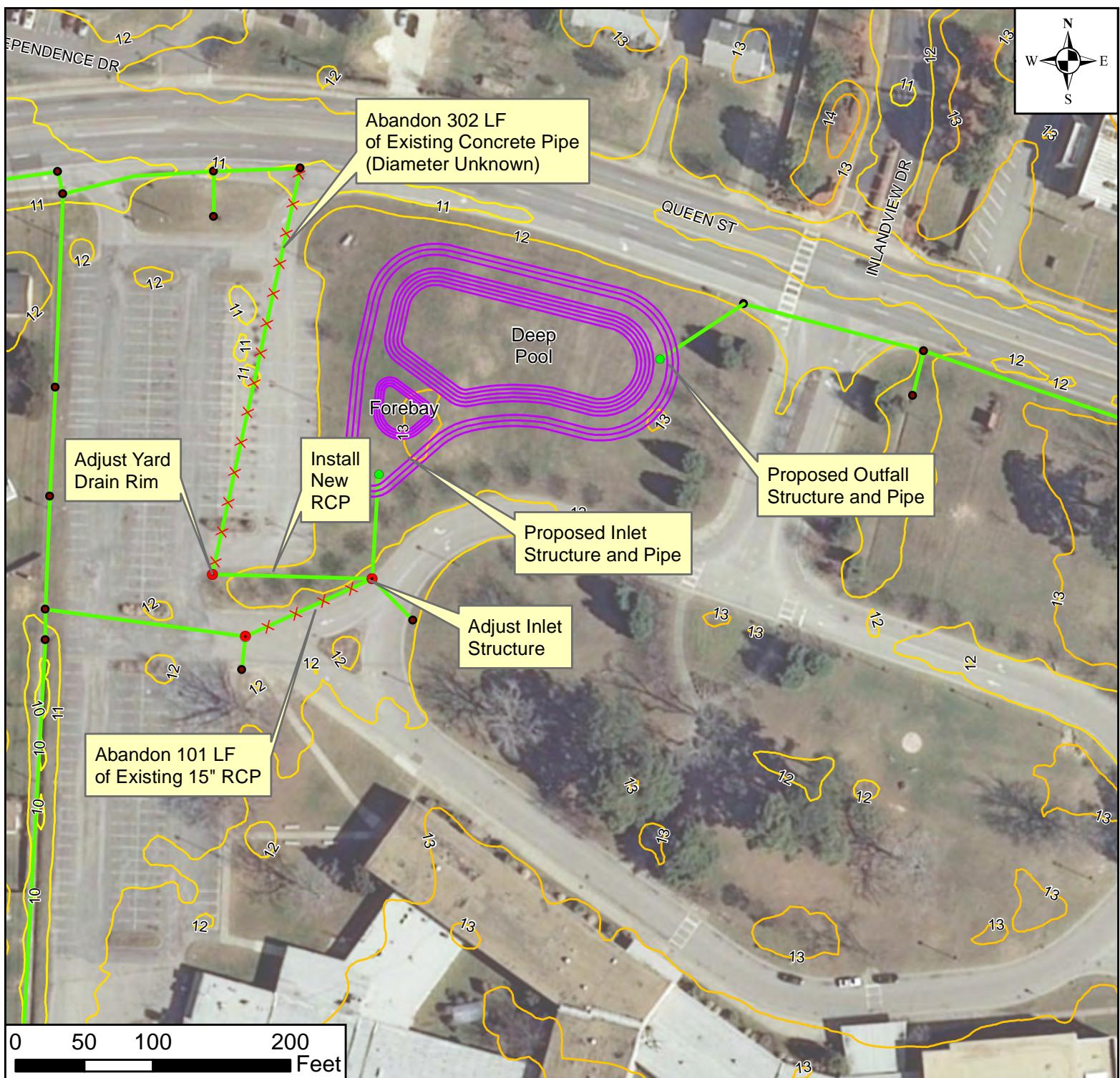
### **Items of Interest**

1. Combining this project with project J may assist with substantially alleviating upstream flooding in the W queen street corridor.

## **Location I Project Summary**

1. Site Description: W Queen St Storm System Improvements
2. Proposed Facility: Flood Alleviation
3. Latitude: 37.024948°
4. Longitude: -76.379510°
5. Total Drainage Area: 4.7 acres
6. % Impervious: 56.5%
7. Total Nitrogen Removal: N/A
8. Total Phosphorus Removal: N/A
9. Total Suspended Solids Removal: N/A
10. Total Cost: \$168,000
11. Cost per lb P: N/A

Briarfield Watershed Study				
Location 'I' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 9,553	1.00	LS	\$ 9,553
<b>Site Preparation</b>				
Staging and Storage Area	\$ 3,500	1.00	EA	\$ 3,500
Clearing and Grubbing	\$ 7,500	0.25	AC	\$ 1,875
<b>Earthwork</b>				
Excavation and dispose offsite	\$ 25	200.00	CY	\$ 5,000
Topsoil (strip, stockpile, regrade)	\$ 5,000	0.25	AC	\$ 1,250
Shaping and Fine Grading	\$ 5,000	0.25	AC	\$ 1,250
Pavement Replacement	\$ 10,000	1.00	LS	\$ 10,000
Sidewalk Replacement	\$ 5,000	1.00	LS	\$ 5,000
<b>Structures</b>				
New Large Structure	\$ 15,000	1.00	EA	\$ 15,000
Existing Structure Modification	\$ 2,000	3.00	EA	\$ 6,000
Class A1 RR	\$ 100	20.00	TN	\$ 2,000
57 Stone	\$ 45	25.00	TN	\$ 1,125
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	1.00	EA	\$ 3,000
Temporary Silt Fence	\$ 3	4800.00	LF	\$ 14,400
Tree Protection	\$ 5	300.00	LF	\$ 1,500
Dewatering	\$ 5,000	1.00	LS	\$ 5,000
Shoring	\$ 10,000	1.00	LS	\$ 10,000
Traffic Control	\$ 8,000	1.00	LS	\$ 8,000
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	0.25	AC	\$ 250
Fertilizer	\$ 500	1.00	LS	\$ 500
General Stabilization seed mix	\$ 3,500	0.25	AC	\$ 875
<b>Subtotal Materials</b>				\$ 95,525
<b>SUBTOTAL= subtotal materials plus mobilization</b>				\$ 105,078
Design Fee				\$ 52,539
10% Contingency				\$ 10,508
<b>Construction (2016 \$)</b>				\$ 168,000
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				



Typical Cross-Section - N.T.S.

**Location J: Hampton High School Level I Wet Pond**

## **Location J: Hampton High School**

### **Existing Conditions**

Hampton High School is located within the Hampton Terrace district of the Briarfield Watershed in Hampton, VA. The City of Hampton owned parcel collects drainage from a total 12 acres of Hampton High School consisting of vehicle parking, sidewalks for the campus and green area along W Queen Street.

There are currently no stormwater quantity/quality control measures on site; however, there are conveyance systems such as a concrete swale, Queen Street storm pipe drainage, and a drainage ditch at the perimeter of the northern part of the school. All stormwater is ultimately conveyed through Queen Street storm drainage and is directed towards the Newmarket Creek. Interstate 664 borders the east side of the Hampton High School property with a parallel drainage ditch.

This project area is not located within a Chesapeake Bay Resource Protection Area. Hampton High School is located within the X flood hazard zone; therefore, the property is higher than the elevation of the 0.2 percent annual chance flood. A review of recorded historical and cultural resources reveals there is no known cultural or historical resource located on the property.

### **Proposed Work**

A level I wet pond, approximately 0.34 acres in size, will be installed onsite north of the campus adjacent to the parking lot. The proposed facility will treat approximately 12 acres (55% impervious), achieving a phosphorus removal of 7.86 lbs per year. The new facility will outfall into the existing drainage system paralleling the eastbound lane of Queen Street. Total Project costs are \$276,000, which equates to a cost per pound of phosphorus removal of \$35,200.

Work associated with constructing the proposed facility includes excavation to depths of 7 feet below existing grade, storm system diversions to intersect and direct flows to the proposed facility, as well as the installation of an outfall system to direct flows back into an existing storm system. Pavements restoration and traffic control are required to complete the storm system diversions. Stabilization, shoring and dewatering operations are required to secure the site during construction due to the excavation operations.

The NRCS soils survey shows soils within the proposed project area are almost entirely AltaVista-Urban Land Complex. A preliminary soils investigation was conducted in the area of the proposed work to confirm the NRCS soils survey, the composition of soils provided in the soils survey as well as a high water table appear to be adequate to construct a wet pond.

### **Limitations**

1. The level 1 wet pond will be located adjacent to Queen Street (35 mph). Screening and fencing will be required.
2. A 15 foot maintenance strip will be required for maintenance.
3. Existing decorative trees will be removed and replaced as part of this project.

### **Items of Interest**

1. The proposed stormwater facility may achieve an additional 3.47 lbs of removal if a level 2 facility can be constructed.
2. The proposed facility is located very near project I. Combining this project with project I will assist with alleviating flooding in Queen Street as well as the neighborhood stormwater system to the west.

## **Location J Project Summary**

1. Site Description: Hampton High School
2. Proposed Facility: Level I Wet Pond
3. Latitude: 37.025598°
4. Longitude: -76.383057°
5. Total Drainage Area: 12.0 acres
6. % Impervious: 55.0%
7. Total Nitrogen Removal: 25.00 lb N/year
8. Total Phosphorus Removal: 7.86 lb P/year
9. Total Suspended Solids Removal: 2,398.50 lb SS/year
10. Total Cost: \$276,000
11. Cost per lb P: \$35,200/lb P

Briarfield Watershed Study				
Location 'J' Cost Estimate				
Category/Bid Items	Unit Price	Qty	Units	Total
Mobilization/Permitting	\$ 17,273	1.00	LS	\$ 17,273
<b>Site Preparation</b>				
Abandon existing 15" RCP	\$ 30	403.00	LF	\$ 12,090
Clearing and Grubbing	\$ 7,500	0.50	AC	\$ 3,750
Staging and Storage Area	\$ 5,000	1.00	LS	\$ 5,000
<b>Earthwork</b>				
Excavation and dispose offsite	\$ 20	4000.00	CY	\$ 80,000
Topsoil (strip, stockpile, regrade)	\$ 5,000	0.50	AC	\$ 2,500
Shaping and Fine Grading	\$ 5,000	0.50	AC	\$ 2,500
Wetlands Plants & Landscaping	\$ 12,000	1.00	LS	\$ 12,000
Remove and Replace decorative trees	\$ 25	143.00	LF	\$ 3,575
<b>Structures</b>				\$ -
Outfall Structure & Piping	\$ 4,500	1.00	EA	\$ 4,500
Install new 15" RCP	\$ 48	291.00	LF	\$ 13,968
VDOT DI-1	\$ 3,500	1.00	EA	\$ 3,500
Class A1 RR	\$ 55	30.00	TN	\$ 1,650
<b>Erosion and Sediment Control</b>				
Construction Entrance	\$ 3,000	1.00	EA	\$ 3,000
Temporary Silt Fence	\$ 3	1000.00	LF	\$ 3,000
Tree Protection	\$ 5	340.00	LF	\$ 1,700
Dewatering	\$ 10,000	1.00	LS	\$ 10,000
Traffic Control	\$ 4,500	1.00	LS	\$ 4,500
<b>Soil &amp; Seedbed Prep &amp; Stabilization</b>				
Soil/Fertilizer/Seed installation	\$ 1,000	1.00	AC	\$ 1,000
Fertilizer	\$ 500	2.00	LS	\$ 1,000
General Stabilization seed mix	\$ 3,500	1.00	AC	\$ 3,500
<b>Subtotal Materials</b>				\$ 172,733
<b>SUBTOTAL= subtotal materials plus mobilization</b>				\$ 190,006
Design Fee				\$ 66,502
10% Contingency				\$ 19,001
<b>Construction (2016 \$)</b>				\$ 276,000
<b>Note: All unit prices include labor, materials, and equipment.</b>				
<b>Design fee includes survey, geotechnical, utility location and engineering.</b>				

Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014					
To be used w/ 2011 BMP Standards and Specifications					
Site Data					
Project Name: Briarfield Watershed Study - Location J - Hampton High School					
Date: February 2016					
<b>1. Post-Development Project &amp; Land Cover Information</b>					
Constants					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26		Nitrogen EMC (mg/L)	1.86	
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				
Land Cover (acres)					
	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	5.48	5.48
Impervious Cover (acres)	0.00	0.00	0.00	6.63	6.63
			Total		12.11
Rv Coefficients					
	A soils	B Soils	C Soils	D Soils	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
Land Cover Summary					
Forest/Open Space Cover (acres)	0.00				
Weighted Rv(forest)	0.00				
% Forest	0%				
Managed Turf Cover (acres)	5.48				
Weighted Rv(turf)	0.25				
% Managed Turf	45%				
Impervious Cover (acres)	6.63				
Rv(impermeable)	0.95				
% Impermeable	55%				
<b>Total Site Area (acres)</b>	12.11				
<b>Site Rv</b>	0.63				
Post-Development Treatment Volume (acre-ft)	0.64				
Post-Development Treatment Volume (cubic feet)	27,837				
Post_Development Load (TP) (lb/yr)	17.49	Post_Development Load (TN) (lb/yr)	125.12		
Total Load (TP) Reduction Required (lb/yr)	12.52				

Drainage Area A	Drainage Area A Land Cover (acres)												
	A Soils	B Soils	C Soils	D Soils	Total	Land Cover %							
Forest/Open Space (acres)	0.00	0.00	0.00	0.00	0.00	0.00							
Managed Turf (acres)	0.00	0.00	0.00	0.48	0.48	0.25							
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	0.00							
					Total	12.11							
							Post Development Treatment Volume (cu)		27837				
Apply Runoff Reduction Practices to Reduce Treatment Volume & Post-Development Load in Drainage Area A													
Practice	Unit	Description of Credit		Credit	Credit Area (acres)	Volume from Upstream Runoff Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Load from Upstream Runoff Practices (lbs)	Phosphorus Efficiency (%)	Remaining Runoff Volume (cf)	Downstream Treatment to be Employed
1. Vegetated Roof													
1.a. Vegetated Roof #1 (Spec#1)	acres of green roof	40%	runoff volume reduction	0.45	0.00	0	0	0	0.00	0.00	0.00	0.00	
1.b. Vegetated Roof #2 (Spec #5)	acres of green roof	60%	runoff volume reduction	0.60	0.00	0	0	0	0.00	0.00	0.00	0.00	
2. Rootop Disconnection													
2.a. Simple Disconnection to A/B Soils (Spec #3)	impervious acres disconnected	50%	runoff volume reduction	0.50	0.00	0	0	0	0.00	0.00	0.00	0.00	
2.b. Simple Disconnection to C/D Soils (Spec #3)	impervious acres disconnected	25%	runoff volume reduction	0.25	0.00	0	0	0	0.00	0.00	0.00	0.00	
2.c. To Soil Amended Filter Path as per practices (excluding CD soils) (Spec #4)	impervious acres disconnected	50%	runoff volume reduction	0.50	0.00	0	0	0	0.00	0.00	0.00	0.00	
2.d. To Dry Well or French Dran #1 (Micro-Bermed) (Spec #5)	impervious acres disconnected	50%	runoff volume reduction	0.50	0.00	0	0	0	25.00	0.00	0.00	15	0.00
2.e. To Dry Well or French Dran #2 (Micro-Bermed) (Spec #5)	impervious acres disconnected	90%	runoff volume reduction	0.90	0.00	0	0	0	25.00	0.00	0.00	15	0.00
2.f. To Rain Garden #1 (Micro-Bermed) (Spec #5)	impervious acres disconnected	40%	volume captured	0.40	0.00	0	0	0	25.00	0.00	0.00	40	0.00
2.g. To Rain Garden #2 (Micro-Bermed) (Spec #5)	impervious acres disconnected	80%	volume captured	0.80	0.00	0	0	0	50.00	0.00	0.00	60	0.00
2.h. To Rainwater Harvesting (Spec #5)	impervious acres captured	based on tank size and design of harvested (See Spec. #5)	0.00	0.00	0	0	0	0.00	0.00	0.00	0.00	0	0.00
2.i. To Stormwater Perv Juran Biomonitor (Spec #5 Appendix A)	impervious acres disconnected	40%	runoff volume reduction	0.40	0.00	0	0	0	25.00	0.00	0.00	40	0.00
3. Permeable Pavement													
3.a. Permeable Pavement #1 (Spec #7)	acres of permeable pavement + areas where infiltration is required	40%	runoff volume reduction	0.45	0.00	0	0	0	25.00	0.00	0.00	25	0.00
3.b. Permeable Pavement #2 (Spec #7)	acres of permeable pavement	75%	runoff volume reduction	0.75	0.00	0	0	0	25.00	0.00	0.00	25	0.00
4. Grass Channel													
4.a. Grass Channel A/B Soils (Spec #3)	impervious acres draining to grass channels	20%	runoff volume reduction	0.20	0.00	0	0	0	15.00	0.00	0.00	20	0.00
4.b. turf area draining to grass channels	turf acres draining to grass channels	20%	runoff volume reduction	0.20	0.00	0	0	0	15.00	0.00	0.00	20	0.00
4.c. Grass Channel C/D Soils (Spec #3)	impervious acres draining to grass channels	10%	runoff volume reduction	0.10	0.00	0	0	0	15.00	0.00	0.00	20	0.00
4.d. turf area draining to grass channels	turf acres draining to grass channels	10%	runoff volume reduction	0.10	0.00	0	0	0	15.00	0.00	0.00	20	0.00
4.e. Grass Channel with Compost Amended Soils as per specs (see Spec #4)	impervious acres draining to grass channels	30%	runoff volume reduction	0.30	0.00	0	0	0	15.00	0.00	0.00	20	0.00
4.f. turf acres draining to grass channels	turf acres draining to grass channels	30%	runoff volume reduction	0.30	0.00	0	0	0	15.00	0.00	0.00	20	0.00
5. Dry Swale													
5.a. Dry Swale #1 (Spec #10)	impervious acres draining to dry swale	40%	runoff volume reduction	0.40	0.00	0	0	0	20.00	0.00	0.00	25	0.00
5.b. turf acres draining to dry swale	turf acres draining to dry swale	40%	runoff volume reduction	0.40	0.00	0	0	0	20.00	0.00	0.00	25	0.00
5.c. Dry Swale #2 (Spec #10)	impervious acres draining to dry swale	60%	runoff volume reduction	0.60	0.00	0	0	0	40.00	0.00	0.00	35	0.00
5.d. turf acres draining to dry swale	turf acres draining to dry swale	60%	runoff volume reduction	0.60	0.00	0	0	0	40.00	0.00	0.00	35	0.00
6. Bioretention													
6.a. Bioretention #1 or Urban Bioretention (Spec #5)	impervious acres draining to bioretention	40%	runoff volume reduction	0.40	0.00	0	0	0	25.00	0.00	0.00	40	0.00
	turf acres draining to bioretention	40%	runoff volume reduction	0.40	0.00	0	0	0	25.00	0.00	0.00	40	0.00
6.b. Bioretention #2 (Spec #5)	impervious acres draining to bioretention	80%	runoff volume reduction	0.80	0.00	0	0	0	50.00	0.00	0.00	60	0.00
	turf acres draining to bioretention	80%	runoff volume reduction	0.80	0.00	0	0	0	50.00	0.00	0.00	60	0.00
7. Infiltration													
7.a. Infiltration #1 (Spec #8)	impervious acres draining to infiltration	50%	runoff volume reduction	0.50	0.00	0	0	0	25.00	0.00	0.00	15	0.00
	turf acres draining to infiltration	50%	runoff volume reduction	0.50	0.00	0	0	0	25.00	0.00	0.00	15	0.00
7.b. Infiltration #2 (Spec #8)	impervious acres draining to infiltration	90%	runoff volume reduction	0.90	0.00	0	0	0	25.00	0.00	0.00	15	0.00
	turf acres draining to infiltration	90%	runoff volume reduction	0.90	0.00	0	0	0	25.00	0.00	0.00	15	0.00
8. Extended Detention Pond													
8.a. ED #1 (Spec #15)	impervious acres draining to ED	0%	runoff volume reduction	0.00	0.00	0	0	0	15.00	0.00	0.00	10	0.00
	turf acres draining to ED	0%	runoff volume reduction	0.00	0.00	0	0	0	15.00	0.00	0.00	10	0.00
8.b. ED #2 (Spec #15)	impervious acres draining to ED	15%	runoff volume reduction	0.15	0.00	0	0	0	15.00	0.00	0.00	10	0.00
	turf acres draining to ED	15%	runoff volume reduction	0.15	0.00	0	0	0	15.00	0.00	0.00	10	0.00
9. Sheetflow to Filter/Open Space													
9.a. Sheetflow to Conservation Area with A/B Soils (Spec #2)	impervious acres draining to open space	75%	runoff volume reduction	0.75	0.00	0	0	0	0.00	0.00	0.00	0	0.00
	turf acres draining to open space	75%	runoff volume reduction	0.75	0.00	0	0	0	0.00	0.00	0.00	0	0.00
9.b. Sheetflow to Conservation Area with C/D Soils (Spec #2)	impervious acres draining to open space	50%	runoff volume reduction	0.50	0.00	0	0	0	0.00	0.00	0.00	0	0.00
	turf acres draining to open space	50%	runoff volume reduction	0.50	0.00	0	0	0	0.00	0.00	0.00	0	0.00
9.c. Sheetflow to Vegetated Filter Strip in A Soils or Compost Amended B/C/D Soils (Spec #2 & #4)	impervious acres draining to filter strip	50%	runoff volume reduction	0.50	0.00	0	0	0	0.00	0.00	0.00	0	0.00
	turf acres draining to filter strip	50%	runoff volume reduction	0.50	0.00	0	0	0	0.00	0.00	0.00	0	0.00
TOTAL IMPERVIOUS COVER TREATED (ac)													
TOTAL TURF AREA TREATED (ac)													
AREA CHECK OK													
TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)													
TOTAL RUNOFF REDUCTION IN D.A. (cu/yr)													
PHOSPHORUS REMOVAL FROM RUNOFF REDUCTION PRACTICES IN D.A. (lb/yr)													
TOTAL NUTRIENT REDUCTION IN D.A. (cu/yr)													
NITROGEN REMOVAL FROM RUNOFF PRACTICES IN D.A. (lb/yr)													
SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS													
Apply Practices that Remove Pollutants but Do Not Reduce Runoff Volume													
Practice	Unit	Description of Credit		Credit	Credit Area (acres)	Volume from Upstream Runoff Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Load from Upstream Runoff Practices (lbs)	Phosphorus Efficiency (%)	Remaining Runoff Volume (cf)	Downstream Treatment to be Employed
10. Wet Swale (Coastal Plain)													
10.a. Wet Swale #1 (Spec #11)	impervious acres draining to wet swale	0%	runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	25	0.00
	turf acres draining to wet swale	0%	runoff volume reduction	0.00	0.00	0	0	0	20	0.00	0.00	25	0.00
10.b. Wet Swale #2 (Spec #11)	impervious acres draining to wet swale	25%	runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	35	0.00
	turf acres draining to wet swale	25%	runoff volume reduction	0.00	0.00	0	0	0	40	0.00	0.00	35	0.00
11. Filtering Practices													
11.a. Filtering Practice #1 (Spec #12)	impervious acres draining to filter	0%	runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	30	0.00
	turf acres draining to filter	0%	runoff volume reduction	0.00	0.00	0	0	0	60	0.00	0.00	30	0.00
11.b. Erosion Practice #2 (Spec #13)	impervious acres draining to filter	0%	runoff volume reduction	0.00	0.00	0	0	0	65	0.00	0.00	45	0.00
	turf acres draining to filter	0%	runoff volume reduction	0.00	0.00	0	0	0	65	0.00	0.00	45	0.00
12. Constructed Wetland													
12.a. Constructed Wetland #1 (Spec #13)	impervious acres draining to wetland	0%	runoff volume reduction	0.00	0.00	0	0	0	50	0.00	0.00	25	0.00
	turf acres draining to wetland	0%	runoff volume reduction	0.00	0.00	0	0	0	50	0.00	0.00	25	0.00
12.b. Constructed Wetland #2 (Spec #13)	impervious acres draining to wetland	0%	runoff volume reduction	0.00	0.00	0	0	0	75	0.00	0.00	55	0.00
	turf acres draining to wetland	0%	runoff volume reduction	0.00	0.00	0	0	0	75	0.00	0.00	55	0.00
13. Wet Ponds													
13.a. Wet Pond #1 (Spec #14)	impervious acres draining to wet pond	0%	runoff volume reduction	0.00	0.00	0	0	0	50	0.00	0.00	30	0.00
	turf acres draining to wet pond	0%	runoff volume reduction	0.00	0.00	0	0	0	50	0.00	0.00	30	0.00
Nitrogen Efficiency (%)		Nitrogen Load From Upstream Practices (lb/yr)				Unreated Nitrogen Load to Practice (lb/yr)				Nitrogen Removed By Practice (lb/yr)			
1. Green Roof		0				0				0			
2. Impervious Surface Disconnection		0				0				0			
3. Permeable Pavement		25				0				0			
4. Grass Channel		20				0				0			
5. Dry Swale		25				0				0			
6. Bioretention		40				0				0			
7. Infiltration		15				0				0			
8. Extended Detention Pond		10				0				0			
9. Sheetflow to Filter/Open Space		10											



Site Results		D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	6.63	0.00	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	6.63	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA	5.48	0.00	0.00	0.00	0.00	0.00	OK.
TURF AREA TREATED	5.48	0.00	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	OK.	
<b>Phosphorus</b>							
TOTAL TREATMENT VOLUME (cf)	27,837						
TOTAL PHOSPHORUS LOAD REDUCTION REQUIRED (LB/YEAR)	12.52						
RUNOFF REDUCTION (cf)	0						
PHOSPHORUS LOAD REDUCTION ACHIEVED (LB/YR)	7.86						
ADJUSTED POST-DEVELOPMENT PHOSPHORUS LOAD (TP) (lb/yr)	9.63						
REMAINING PHOSPHORUS LOAD REDUCTION (LB/YR) NEEDED	4.66						
<b>Nitrogen (for information purposes)</b>							
TOTAL TREATMENT VOLUME (cf)	27,837						
RUNOFF REDUCTION (cf)	0						
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	25.00						
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TN) (lb/yr)	100.12						

## Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

**Site Data Summary**

Total Rainfall = 43 inches

**Site Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	5.48	5.48	45.25
Impervious (acres)	0.00	0.00	0.00	6.63	6.63	54.75
					12.11	100.00

Site Rv	0.63
Post Development Treatment Volume (ft <sup>3</sup> )	27837
Post Development TP Load (lb/yr)	17.49
Post Development TN Load (lb/yr)	125.12
Total TP Load Reduction Required (lb/yr)	12.52

Total Runoff Volume Reduction (ft <sup>3</sup> )	0
Total TP Load Reduction Achieved (lb/yr)	8
Total TN Load Reduction Achieved (lb/yr)	25.00
Adjusted Post Development TP Load (lb/yr)	9.63
Remaining Phosphorous Load Reduction (lb/yr) Required	4.66

**Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	5.48	0.00	0.00	0.00	0.00	5.48
Impervious (acres)	6.63	0.00	0.00	0.00	0.00	6.63
						12.11

**Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	7.86	0.00	0.00	0.00	0.00	7.86
TN Load Red. (lb/yr)	25.00	0.00	0.00	0.00	0.00	25.00

**Drainage Area A Summary**Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Turf (acres)	0.00	0.00	0.00	5.48	5.48	45.25
Impervious (acres)	0.00	0.00	0.00	6.63	6.63	54.75
					12.11	

BMP Selections

Practice	Credit Area (acres)		Downstream Practice
12.a.Constructed Wetland #1 (Spec #13)	Impervious:	3.49	

Total Impervious Cover Treated (acres)	6.63
Total Turf Area Treated (acres)	5.48
Total TP Load Reduction Achieved in D.A. A (lb/yr)	7.86
Total TN Load Reduction Achieved in D.A. A (lb/yr)	25.00

**Channel and Flood Protection**

	Weighted CN	1-year storm Adjusted CN	2-year storm Adjusted CN	10-year storm Adjusted CN
Target Rainfall Event (in)		0.00	0.00	0.00
D.A. A CN	90	100	100	100
D.A. B CN	0	100	100	100
D.A. C CN	0	100	100	100
D.A. D CN	0	100	100	100
D.A. E CN	0	100	100	100

## **Appendix D Hydraulic Model**

### **Appendix Includes:**

- 10 Year Storm/10 Year Tailwater Summary Table
- Model:
  - Mean High Water Tailwater Condition
  - 10 Year Tailwater Condition
  - 50 Year Tailwater Condition

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.006)

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WARNING 04: minimum elevation drop used for Conduit DR5-5181

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NOTE: The summary statistics displayed in this report are  
based on results found at every computational time step,  
not just on results from each reporting time step.

\*\*\*\*\*

\*\*\*\*\*

Analysis Options

\*\*\*\*\*

Flow Units ..... CFS

Process Models:

Rainfall/Runoff ..... YES

RDII ..... NO

Snowmelt ..... NO

Groundwater ..... NO

Flow Routing ..... YES

Ponding Allowed ..... YES

Water Quality ..... NO

Infiltration Method ..... GREEN\_AMPT

Flow Routing Method ..... DYNWAVE

Starting Date ..... JAN-01-1995 00:00:00

Ending Date ..... JAN-02-1995 12:00:00

Antecedent Dry Days ..... 0.0

Report Time Step ..... 00:01:00

Wet Time Step ..... 00:01:00

Dry Time Step ..... 01:00:00

Routing Time Step ..... 1.00 sec

Variable Time Step ..... YES

Maximum Trials ..... 8

Head Tolerance ..... 0.005000 ft

\*\*\*\*\*

Element Count

\*\*\*\*\*

Number of rain gages ..... 1

Number of subcatchments ... 284

Number of nodes ..... 346

Briarfield10yrtwExisting-10yr24hr

Number of links ..... 321  
Number of pollutants ..... 0  
Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

Name	Data Source	Data	Recording
		Type	Interval
SCSTypell,24hr	10yr24hr	CUMULATIVE	6 min.

\*\*\*\*\*

Subcatchment Summary

\*\*\*\*\*

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
DR5-0474#1	1.30	140.00	41.00	1.1700	SCSTypell,24hr	DR5-0474
DR5-0498#1	23.49	500.00	37.00	0.3200	SCSTypell,24hr	DR5-0498
DR5-0504#1	5.60	300.00	34.00	0.2800	SCSTypell,24hr	DR5-0504
DR5-0524#1	6.84	375.00	42.00	0.2600	SCSTypell,24hr	DR5-0524
DR5-0572#1	0.31	80.00	83.00	0.6700	SCSTypell,24hr	DR5-0572
DR5-0584#1	0.55	216.00	17.00	1.1800	SCSTypell,24hr	DR5-0584
DR5-0593#1	0.52	140.00	13.00	3.3300	SCSTypell,24hr	DR5-0593
DR5-0599#1	1.01	150.00	72.00	0.5300	SCSTypell,24hr	DR5-0599
DR5-0648#1	1.05	185.00	73.00	0.7100	SCSTypell,24hr	DR5-0648
DR5-0661#1	23.34	850.00	32.00	0.3700	SCSTypell,24hr	DR5-0661
DR5-0681#1	0.95	200.00	65.00	0.4000	SCSTypell,24hr	DR5-0681
DR5-0689#1	1.19	125.00	9.00	0.8800	SCSTypell,24hr	DR5-0689
DR5-0690#1	1.36	200.00	35.00	0.5600	SCSTypell,24hr	DR5-0690
DR5-0691#1	3.33	260.00	38.00	0.3800	SCSTypell,24hr	DR5-0691
DR5-0712#1	2.85	250.00	42.00	0.2100	SCSTypell,24hr	DR5-0712
DR5-0714#1	1.25	240.00	83.00	0.3300	SCSTypell,24hr	DR5-0714
DR5-0715#1	2.79	200.00	2.00	0.1800	SCSTypell,24hr	DR5-0715
DR5-0716#1	0.81	50.00	1.00	0.3300	SCSTypell,24hr	DR5-0716
DR5-0718#1	11.34	500.00	45.00	0.3000	SCSTypell,24hr	DR5-0718
DR5-0724#1	2.85	150.00	43.00	0.6600	SCSTypell,24hr	DR5-0724
DR5-0730#1	94.45	1030.00	42.00	0.2300	SCSTypell,24hr	DR5-0730
DR5-0737#1	0.61	90.00	33.00	0.3100	SCSTypell,24hr	DR5-0737
DR5-0738#1	0.78	110.00	29.00	0.3600	SCSTypell,24hr	DR5-0738
DR5-0739#1	1.79	150.00	49.00	0.4000	SCSTypell,24hr	DR5-0739
DR5-0744#1	4.68	275.00	38.00	2.2900	SCSTypell,24hr	DR5-0744

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DR5-0751#1	0.53	115.00	28.00	1.6000 SCSTypell,24hr	DR5-0751
DR5-0754#1	1.51	275.00	99.00	0.2900 SCSTypell,24hr	DR5-0754
DR5-0769#1	0.54	130.00	36.00	1.3300 SCSTypell,24hr	DR5-0769
DR5-0772#1	0.41	200.00	30.00	0.7100 SCSTypell,24hr	DR5-0772
DR5-0781#1	1.73	200.00	26.00	0.5500 SCSTypell,24hr	DR5-0781
DR5-0782#1	0.22	80.00	13.00	1.5400 SCSTypell,24hr	DR5-0782
DR5-0783#1	14.34	375.00	39.00	0.4700 SCSTypell,24hr	DR5-0783
DR5-0790#1	0.38	90.00	22.00	0.6300 SCSTypell,24hr	DR5-0790
DR5-0792#1	0.44	100.00	19.00	1.2500 SCSTypell,24hr	DR5-0792
DR5-0800#1	5.01	450.00	71.00	1.3300 SCSTypell,24hr	DR5-0800
DR5-0806#1	1.93	300.00	2.00	0.9100 SCSTypell,24hr	DR5-0806
DR5-0808#1	2.65	260.00	78.00	1.0000 SCSTypell,24hr	DR5-0808
DR5-0809#1	4.10	320.00	35.00	0.8000 SCSTypell,24hr	DR5-0809
DR5-0810#1	12.51	300.00	33.00	0.5000 SCSTypell,24hr	DR5-0810
DR5-0814#1	4.11	210.00	28.00	1.1000 SCSTypell,24hr	DR5-0814
DR5-0818#1	2.35	225.00	46.00	0.5700 SCSTypell,24hr	DR5-0818
DR5-0833#1	0.24	90.00	82.00	1.7400 SCSTypell,24hr	DR5-0833
DR5-0841#1	3.92	175.00	28.00	0.5000 SCSTypell,24hr	DR5-0841
DR5-0852#1	1.48	190.00	15.00	1.2100 SCSTypell,24hr	DR5-0852
DR5-0858#1	3.00	310.00	6.00	4.0400 SCSTypell,24hr	DR5-0858
DR5-0868#1	5.56	250.00	40.00	1.4800 SCSTypell,24hr	DR5-0868
DR5-0873#1	0.21	100.00	79.00	0.6700 SCSTypell,24hr	DR5-0873
DR5-0874#1	2.00	300.00	49.00	10.7700 SCSTypell,24hr	DR5-0874
DR5-0876#1	9.56	400.00	23.00	0.4000 SCSTypell,24hr	DR5-0876
DR5-0888#1	0.82	170.00	86.00	1.0700 SCSTypell,24hr	DR5-0888
DR5-0889#1	8.19	500.00	19.00	0.6100 SCSTypell,24hr	DR5-0889
DR5-0896#1	1.94	240.00	50.00	4.7200 SCSTypell,24hr	DR5-0896
DR5-0898#1	7.58	225.00	82.00	0.5200 SCSTypell,24hr	DR5-0898
DR5-0907#1	1.22	150.00	74.00	0.6200 SCSTypell,24hr	DR5-0907
DR5-0914#1	6.09	400.00	64.00	0.1100 SCSTypell,24hr	DR5-0914
DR5-0925#1	2.66	225.00	89.00	0.2200 SCSTypell,24hr	DR5-0925
DR5-0932#1	1.11	115.00	25.00	2.8600 SCSTypell,24hr	DR5-0932
DR5-0942#1	5.13	175.00	56.00	3.3100 SCSTypell,24hr	DR5-0942
DR5-0947#1	2.31	350.00	4.00	0.6200 SCSTypell,24hr	DR5-0947
DR5-0951#1	1.84	125.00	72.00	1.9500 SCSTypell,24hr	DR5-0951
DR5-0958#1	1.55	280.00	62.00	0.3200 SCSTypell,24hr	DR5-0958
DR5-0966#1	0.93	110.00	78.00	0.3200 SCSTypell,24hr	DR5-0966
DR5-0973#1	1.33	115.00	69.00	0.5900 SCSTypell,24hr	DR5-0973
DR5-0983#1	0.83	125.00	52.00	1.1400 SCSTypell,24hr	DR5-0983
DR5-0988#1	0.89	60.00	64.00	0.3200 SCSTypell,24hr	DR5-0988
DR5-0991#1	0.40	60.00	68.00	0.5600 SCSTypell,24hr	DR5-0991
DR5-0992#1	1.55	160.00	74.00	0.2900 SCSTypell,24hr	DR5-0992
DR5-0999#1	31.98	750.00	66.00	0.3100 SCSTypell,24hr	DR5-0999
DR5-1004#1	1.07	160.00	89.00	0.2300 SCSTypell,24hr	DR5-1004

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DR5-1005#1	0.72	105.00	15.00	0.3100	SCSTypell,24hr	DR5-1005
DR5-1012#1	2.11	175.00	75.00	0.4600	SCSTypell,24hr	DR5-1012
DR5-1032#1	0.83	160.00	54.00	0.6700	SCSTypell,24hr	DR5-1032
DR5-1033#1	0.69	180.00	91.00	0.5000	SCSTypell,24hr	DR5-1033
DR5-1034#1	0.39	80.00	61.00	0.3800	SCSTypell,24hr	DR5-1034
DR5-1035#1	17.26	650.00	83.00	0.3500	SCSTypell,24hr	DR5-1035
DR5-1311#1	0.76	120.00	84.00	1.0400	SCSTypell,24hr	DR5-1311
DR5-1334#1	0.27	110.00	57.00	2.2900	SCSTypell,24hr	DR5-1334
DR5-1350#1	0.34	100.00	74.00	1.1100	SCSTypell,24hr	DR5-1350
DR5-1361#1	1.17	235.00	43.00	0.8200	SCSTypell,24hr	DR5-1361
DR5-1363#1	0.61	115.00	51.00	1.1900	SCSTypell,24hr	DR5-1363
DR5-1371#1	2.52	260.00	41.00	0.1800	SCSTypell,24hr	DR5-1371
DR5-1372#1	0.18	80.00	86.00	1.4900	SCSTypell,24hr	DR5-1372
DR5-1378#1	1.09	25.00	100.00	1.5600	SCSTypell,24hr	DR5-1378
DR5-1379#1	0.30	110.00	66.00	1.3300	SCSTypell,24hr	DR5-1379
DR5-1391#1	3.60	220.00	44.00	0.3200	SCSTypell,24hr	DR5-1391
DR5-1395#1	1.93	200.00	36.00	0.4200	SCSTypell,24hr	DR5-1395
DR5-1396#1	1.07	20.00	100.00	4.1500	SCSTypell,24hr	DR5-1396
DR5-1404#1	4.16	360.00	40.00	0.2700	SCSTypell,24hr	DR5-1404
DR5-1405#1	2.52	100.00	44.00	0.1500	SCSTypell,24hr	DR5-1405
DR5-1408#1	1.43	90.00	61.00	0.2700	SCSTypell,24hr	DR5-1408
DR5-1409#1	0.65	140.00	72.00	1.0800	SCSTypell,24hr	DR5-1409
DR5-1429#1	3.71	260.00	32.00	0.4700	SCSTypell,24hr	DR5-1429
DR5-1464#1	1.04	135.00	74.00	0.6900	SCSTypell,24hr	DR5-1464
DR5-1493#1	5.84	330.00	38.00	1.0400	SCSTypell,24hr	DR5-1493
DR5-1518#1	0.76	221.00	53.00	0.5600	SCSTypell,24hr	DR5-1518
DR5-1522#1	0.67	80.00	50.00	0.7300	SCSTypell,24hr	DR5-1522
DR5-1530#1	2.71	300.00	30.00	0.3300	SCSTypell,24hr	DR5-1530
DR5-1531#1	1.43	150.00	49.00	0.7800	SCSTypell,24hr	DR5-1531
DR5-1533#1	0.25	100.00	43.00	0.2200	SCSTypell,24hr	DR5-1533
DR5-1554#1	2.31	75.00	49.00	0.2700	SCSTypell,24hr	DR5-1554
DR5-1555#1	2.43	200.00	19.00	0.4600	SCSTypell,24hr	DR5-1555
DR5-1557#1	2.74	65.00	41.00	0.2900	SCSTypell,24hr	DR5-1557
DR5-1591#1	8.53	350.00	39.00	0.2000	SCSTypell,24hr	DR5-1591
DR5-1596#1	1.89	130.00	55.00	0.4700	SCSTypell,24hr	DR5-1596
DR5-1597#1	5.34	450.00	42.00	0.4200	SCSTypell,24hr	DR5-1597
DR5-1607#1	7.78	400.00	55.00	0.5600	SCSTypell,24hr	DR5-1607
DR5-1614#1	3.20	200.00	41.00	0.6400	SCSTypell,24hr	DR5-1614
DR5-1615#1	6.23	200.00	40.00	0.3200	SCSTypell,24hr	DR5-1615
DR5-1623#1	0.62	100.00	49.00	0.9500	SCSTypell,24hr	DR5-1623
DR5-1626#1	0.68	100.00	60.00	0.8000	SCSTypell,24hr	DR5-1626
DR5-1629#1	0.74	165.00	87.00	1.4000	SCSTypell,24hr	DR5-1629
DR5-1632#1	0.34	35.00	86.00	0.7700	SCSTypell,24hr	DR5-1632
DR5-1633#1	1.09	75.00	45.00	0.7300	SCSTypell,24hr	DR5-1633

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DR5-1636#1	11.26	375.00	32.00	0.4700	SCSTypell,24hr	DR5-1636
DR5-1637#1	10.64	315.00	28.00	0.6000	SCSTypell,24hr	DR5-1637
DR5-1640#1	2.47	190.00	84.00	0.8900	SCSTypell,24hr	DR5-1640
DR5-1646#1	2.15	260.00	92.00	0.8600	SCSTypell,24hr	DR5-1646
DR5-1647#1	1.09	125.00	29.00	0.9700	SCSTypell,24hr	DR5-1647
DR5-1657#1	0.45	75.00	54.00	0.5100	SCSTypell,24hr	DR5-1657
DR5-1659#1	0.61	75.00	56.00	0.4000	SCSTypell,24hr	DR5-1659
DR5-1672#1	3.17	240.00	53.00	0.5000	SCSTypell,24hr	DR5-1672
DR5-1689#1	15.71	730.00	28.00	0.5500	SCSTypell,24hr	DR5-1689
DR5-1694#1	1.67	110.00	65.00	0.4500	SCSTypell,24hr	DR5-1694
DR5-1698#1	1.67	150.00	77.00	0.7700	SCSTypell,24hr	DR5-1698
DR5-1701#1	0.09	70.00	76.00	1.3300	SCSTypell,24hr	DR5-1701
DR5-1704#1	1.70	160.00	58.00	0.6700	SCSTypell,24hr	DR5-1704
DR5-1705#1	1.82	100.00	76.00	0.8600	SCSTypell,24hr	DR5-1705
DR5-1707#1	1.25	100.00	66.00	0.8100	SCSTypell,24hr	DR5-1707
DR5-1732#1	2.17	215.00	72.00	0.4900	SCSTypell,24hr	DR5-1732
DR5-1738#1	1.25	150.00	74.00	0.6500	SCSTypell,24hr	DR5-1738
DR5-1754#1	1.03	125.00	76.00	0.3600	SCSTypell,24hr	DR5-1754
DR5-1757#1	0.88	95.00	81.00	0.7400	SCSTypell,24hr	DR5-1757
DR5-1760#1	15.41	815.00	77.00	0.2200	SCSTypell,24hr	DR5-1760
DR5-1779#1	1.52	215.00	92.00	0.2900	SCSTypell,24hr	DR5-1779
DR5-1780#1	6.24	350.00	61.00	0.3200	SCSTypell,24hr	DR5-1780
DR5-1781#1	1.00	130.00	95.00	0.7500	SCSTypell,24hr	DR5-1781
DR5-1787#1	0.93	130.00	90.00	0.8000	SCSTypell,24hr	DR5-1787
DR5-1792#1	0.91	170.00	54.00	1.3300	SCSTypell,24hr	DR5-1792
DR5-1795#1	0.94	130.00	92.00	0.5600	SCSTypell,24hr	DR5-1795
DR5-1796#1	1.83	235.00	69.00	0.6700	SCSTypell,24hr	DR5-1796
DR5-1797#1	1.00	160.00	87.00	0.3300	SCSTypell,24hr	DR5-1797
DR5-1799#1	2.09	160.00	90.00	0.4200	SCSTypell,24hr	DR5-1799
DR5-1802#1	1.98	300.00	84.00	0.2100	SCSTypell,24hr	DR5-1802
DR5-1803#1	0.94	150.00	67.00	0.3400	SCSTypell,24hr	DR5-1803
DR5-1804#1	1.99	85.00	93.00	0.2900	SCSTypell,24hr	DR5-1804
DR5-1805#1	0.74	150.00	74.00	0.3600	SCSTypell,24hr	DR5-1805
DR5-1809#1	0.88	140.00	99.00	0.5700	SCSTypell,24hr	DR5-1809
DR5-1810#1	0.79	175.00	90.00	0.9100	SCSTypell,24hr	DR5-1810
DR5-1811#1	0.51	75.00	30.00	0.3300	SCSTypell,24hr	DR5-1811
DR5-1812#1	11.31	550.00	65.00	0.2300	SCSTypell,24hr	DR5-1812
DR5-1819#1	1.74	150.00	63.00	0.2500	SCSTypell,24hr	DR5-1819
DR5-1940#1	0.35	50.00	80.00	0.9300	SCSTypell,24hr	DR5-1940
DR5-1955#1	2.47	200.00	74.00	0.5200	SCSTypell,24hr	DR5-1955
DR5-2033#1	4.14	480.00	39.00	0.6300	SCSTypell,24hr	DR5-2033
DR5-2087#1	2.15	275.00	95.00	0.5400	SCSTypell,24hr	DR5-2087
DR5-2091#1	0.28	95.00	57.00	0.6300	SCSTypell,24hr	DR5-2091
DR5-2092#1	0.65	140.00	91.00	1.0000	SCSTypell,24hr	DR5-2092

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DR5-2096#1	0.21	50.00	92.00	0.4500	SCSTypell,24hr	DR5-2096
DR5-2097#1	0.10	70.00	89.00	0.5300	SCSTypell,24hr	DR5-2097
DR5-2192#1	0.19	70.00	85.00	6.6600	SCSTypell,24hr	DR5-2192
DR5-2221#1	0.80	100.00	99.00	2.0000	SCSTypell,24hr	DR5-2221
DR5-2239#1	1.11	230.00	1.00	0.5400	SCSTypell,24hr	DR5-2239
DR5-2240#1	1.02	170.00	77.00	0.4300	SCSTypell,24hr	DR5-2240
DR5-2241#1	1.09	140.00	70.00	0.5400	SCSTypell,24hr	DR5-2241
DR5-2242#1	3.31	300.00	52.00	0.4000	SCSTypell,24hr	DR5-2242
DR5-2259#1	1.68	110.00	52.00	0.5900	SCSTypell,24hr	DR5-2259
DR5-2260#1	0.30	50.00	61.00	0.4700	SCSTypell,24hr	DR5-2260
DR5-2261#1	0.59	150.00	55.00	14.5000	SCSTypell,24hr	DR5-2261
DR5-2262#1	0.19	110.00	50.00	24.0000	SCSTypell,24hr	DR5-2262
DR5-2263#1	0.45	100.00	26.00	6.0000	SCSTypell,24hr	DR5-2263
DR5-2264#1	0.36	120.00	4.00	8.1300	SCSTypell,24hr	DR5-2264
DR5-2846#1	0.48	100.00	50.00	1.0000	SCSTypell,24hr	DR5-2846
DR5-2848#1	3.39	380.00	62.00	0.6000	SCSTypell,24hr	DR5-2848
DR5-2852#1	3.78	375.00	71.00	0.5500	SCSTypell,24hr	DR5-2852
DR5-2864#1	0.59	120.00	30.00	1.8700	SCSTypell,24hr	DR5-2864
DR5-2884#1	0.71	150.00	84.00	0.5000	SCSTypell,24hr	DR5-2884
DR5-2886#1	1.09	210.00	45.00	0.9200	SCSTypell,24hr	DR5-2886
DR5-2887#1	7.38	375.00	65.00	0.8900	SCSTypell,24hr	DR5-2887
DR5-2890#1	0.86	170.00	86.00	0.6700	SCSTypell,24hr	DR5-2890
DR5-2900#1	0.83	180.00	53.00	1.5000	SCSTypell,24hr	DR5-2900
DR5-2905#1	0.71	140.00	92.00	1.0000	SCSTypell,24hr	DR5-2905
DR5-2914#1	3.57	300.00	65.00	0.7000	SCSTypell,24hr	DR5-2914
DR5-2917#1	2.05	200.00	57.00	0.8700	SCSTypell,24hr	DR5-2917
DR5-3028#1	0.33	130.00	18.00	4.1200	SCSTypell,24hr	DR5-3028
DR5-3029#1	2.30	175.00	76.00	0.3000	SCSTypell,24hr	DR5-3029
DR5-3042#1	1.69	175.00	47.00	0.6300	SCSTypell,24hr	DR5-3042
DR5-3044#1	6.24	540.00	100.00	1.1600	SCSTypell,24hr	DR5-3044
DR5-3045#1	0.77	100.00	82.00	1.2300	SCSTypell,24hr	DR5-3045
DR5-3052#1	0.98	100.00	99.00	0.3300	SCSTypell,24hr	DR5-3052
DR5-3056#1	6.71	450.00	92.00	4.3200	SCSTypell,24hr	DR5-3056
DR5-3058#1	1.24	220.00	89.00	0.3600	SCSTypell,24hr	DR5-3058
DR5-3061#1	1.94	210.00	97.00	0.3200	SCSTypell,24hr	DR5-3061
DR5-3068#1	2.17	275.00	67.00	0.5700	SCSTypell,24hr	DR5-3068
DR5-3069#1	2.00	260.00	87.00	2.8600	SCSTypell,24hr	DR5-3069
DR5-3072#1	1.51	145.00	100.00	1.0000	SCSTypell,24hr	DR5-3072
DR5-3077#1	1.43	250.00	79.00	0.8000	SCSTypell,24hr	DR5-3077
DR5-3080#1	1.76	200.00	76.00	0.9500	SCSTypell,24hr	DR5-3080
DR5-3085#1	0.63	90.00	27.00	2.1700	SCSTypell,24hr	DR5-3085
DR5-3109#1	1.82	300.00	64.00	1.1800	SCSTypell,24hr	DR5-3109
DR5-3123#1	0.62	170.00	67.00	0.6500	SCSTypell,24hr	DR5-3123
DR5-3124#1	0.12	35.00	70.00	1.0000	SCSTypell,24hr	DR5-3124

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DR5-3125#1	0.61	115.00	21.00	1.8600	SCSTypell,24hr	DR5-3125
DR5-3127#1	1.48	160.00	42.00	1.8200	SCSTypell,24hr	DR5-3127
DR5-3176#1	1.46	170.00	89.00	0.7500	SCSTypell,24hr	DR5-3176
DR5-3217#1	2.38	275.00	18.00	1.2700	SCSTypell,24hr	DR5-3217
DR5-3218#1	3.60	370.00	83.00	0.3400	SCSTypell,24hr	DR5-3218
DR5-3219#1	1.59	150.00	86.00	0.6300	SCSTypell,24hr	DR5-3219
DR5-3229#1	16.59	715.00	45.00	0.1100	SCSTypell,24hr	DR5-3229
DR5-3651#1	0.37	30.00	57.00	1.0400	SCSTypell,24hr	DR5-3651
DR5-3654#1	1.46	230.00	55.00	0.7600	SCSTypell,24hr	DR5-3654
DR5-3666#1	4.44	170.00	48.00	0.3800	SCSTypell,24hr	DR5-3666
DR5-3672#1	5.95	175.00	27.00	0.3100	SCSTypell,24hr	DR5-3672
DR5-3697#1	0.53	110.00	37.00	0.5000	SCSTypell,24hr	DR5-3697
DR5-3723#1	1.07	20.00	92.00	4.9200	SCSTypell,24hr	DR5-3723
DR5-3724#1	1.24	90.00	81.00	13.1700	SCSTypell,24hr	DR5-3724
DR5-3726#1	19.61	425.00	37.00	1.1500	SCSTypell,24hr	DR5-3726
DR5-3740#1	1.39	150.00	38.00	7.1700	SCSTypell,24hr	DR5-3740
DR5-3746#1	0.51	95.00	75.00	0.3700	SCSTypell,24hr	DR5-3746
DR5-3750#1	2.59	285.00	55.00	0.2700	SCSTypell,24hr	DR5-3750
DR5-3757#1	0.65	150.00	35.00	0.4800	SCSTypell,24hr	DR5-3757
DR5-3792#1	1.78	180.00	31.00	1.0800	SCSTypell,24hr	DR5-3792
DR5-3822#1	5.04	350.00	38.00	0.2300	SCSTypell,24hr	DR5-3822
DR5-3826#1	0.53	130.00	41.00	0.5700	SCSTypell,24hr	DR5-3826
DR5-3844#1	0.59	75.00	98.00	0.6900	SCSTypell,24hr	DR5-3844
DR5-3857#1	4.25	230.00	66.00	0.7000	SCSTypell,24hr	DR5-3857
DR5-3859#1	0.28	75.00	96.00	0.6700	SCSTypell,24hr	DR5-3859
DR5-3866#1	11.04	500.00	33.00	0.5000	SCSTypell,24hr	DR5-3866
DR5-3875#1	16.28	500.00	8.00	0.5800	SCSTypell,24hr	DR5-3875
DR5-3886#1	8.28	500.00	39.00	0.5500	SCSTypell,24hr	DR5-3886
DR5-3902#1	7.57	310.00	41.00	0.4300	SCSTypell,24hr	DR5-3902
DR5-3903#1	0.47	125.00	70.00	1.3300	SCSTypell,24hr	DR5-3903
DR5-3905#1	3.06	290.00	28.00	0.4300	SCSTypell,24hr	DR5-3905
DR5-3911#1	0.58	130.00	97.00	0.4000	SCSTypell,24hr	DR5-3911
DR5-3916#1	3.92	260.00	66.00	0.3500	SCSTypell,24hr	DR5-3916
DR5-3932#1	1.10	150.00	47.00	1.1100	SCSTypell,24hr	DR5-3932
DR5-3934#1	0.97	115.00	74.00	0.3000	SCSTypell,24hr	DR5-3934
DR5-3938#1	4.29	270.00	71.00	0.6000	SCSTypell,24hr	DR5-3938
DR5-3961#1	0.75	135.00	73.00	0.5000	SCSTypell,24hr	DR5-3961
DR5-3966#1	2.20	250.00	88.00	0.4000	SCSTypell,24hr	DR5-3966
DR5-3968#1	3.18	210.00	86.00	0.2100	SCSTypell,24hr	DR5-3968
DR5-3971#1	0.92	115.00	88.00	1.0000	SCSTypell,24hr	DR5-3971
DR5-4196#1	3.36	185.00	42.00	0.5200	SCSTypell,24hr	DR5-4196
DR5-4206#1	0.08	10.00	45.00	0.2600	SCSTypell,24hr	DR5-4206
DR5-4218#1	0.53	80.00	36.00	0.7700	SCSTypell,24hr	DR5-4218
DR5-4222#1	5.04	210.00	31.00	0.4000	SCSTypell,24hr	DR5-4222

Briarfield10yrtwExisting-10yr24hr

DR5-4224#1	0.40	75.00	33.00	0.2000 SCSTypell,24hr	DR5-4224
DR5-4225#1	2.71	250.00	49.00	1.0900 SCSTypell,24hr	DR5-4225
DR5-4230#1	7.75	310.00	35.00	0.5400 SCSTypell,24hr	DR5-4230
DR5-4236#1	3.87	250.00	19.00	0.5700 SCSTypell,24hr	DR5-4236
DR5-4281#1	0.43	75.00	43.00	0.9300 SCSTypell,24hr	DR5-4281
DR5-4282#1	0.73	75.00	45.00	0.5000 SCSTypell,24hr	DR5-4282
DR5-4293#1	0.37	90.00	47.00	0.4700 SCSTypell,24hr	DR5-4293
DR5-4298#1	19.34	590.00	34.00	0.1500 SCSTypell,24hr	DR5-4298
DR5-4302#1	2.41	160.00	90.00	0.3300 SCSTypell,24hr	DR5-4302
DR5-4305#1	8.47	300.00	68.00	0.4100 SCSTypell,24hr	DR5-4305
DR5-4307#1	4.81	250.00	64.00	1.2900 SCSTypell,24hr	DR5-4307
DR5-4310#1	16.00	775.00	75.00	0.2000 SCSTypell,24hr	DR5-4310
DR5-4311#1	0.22	40.00	81.00	0.9100 SCSTypell,24hr	DR5-4311
DR5-4314#1	2.48	325.00	63.00	0.2900 SCSTypell,24hr	DR5-4314
DR5-4315#1	18.61	550.00	72.00	0.1900 SCSTypell,24hr	DR5-4315
DR5-4317#1	1.60	140.00	93.00	0.5700 SCSTypell,24hr	DR5-4317
DR5-4323#1	0.31	130.00	45.00	2.6700 SCSTypell,24hr	DR5-4323
DR5-4327#1	1.87	140.00	76.00	0.3500 SCSTypell,24hr	DR5-4327
DR5-4328#1	4.72	290.00	56.00	0.4000 SCSTypell,24hr	DR5-4328
DR5-4344#1	0.47	100.00	54.00	4.5800 SCSTypell,24hr	DR5-4344
DR5-4351#1	0.79	100.00	38.00	0.3500 SCSTypell,24hr	DR5-4351
DR5-4355#1	1.72	225.00	42.00	0.3800 SCSTypell,24hr	DR5-4355
DR5-4356#1	0.79	110.00	26.00	0.3600 SCSTypell,24hr	DR5-4356
DR5-4357#1	0.26	55.00	25.00	0.3200 SCSTypell,24hr	DR5-4357
DR5-4358#1	0.30	60.00	26.00	0.3000 SCSTypell,24hr	DR5-4358
DR5-4360#1	1.47	195.00	52.00	0.2800 SCSTypell,24hr	DR5-4360
DR5-4633#1	1.43	140.00	36.00	2.0300 SCSTypell,24hr	DR5-4633
DR5-4634#1	1.03	135.00	56.00	2.5600 SCSTypell,24hr	DR5-4634
DR5-4657#1	0.94	80.00	75.00	1.0700 SCSTypell,24hr	DR5-4657
DR5-4658#1	5.51	275.00	57.00	0.4200 SCSTypell,24hr	DR5-4658
DR5-5300#1	0.27	100.00	29.00	0.5900 SCSTypell,24hr	DR5-5300
DR5-5354#1	22.50	625.00	44.00	0.2200 SCSTypell,24hr	DR5-5354
DR5-5364#1	1.21	170.00	52.00	0.6000 SCSTypell,24hr	DR5-5364
DR5-5365#1	0.74	100.00	50.00	0.6300 SCSTypell,24hr	DR5-5365
DR5-5366#1	1.59	130.00	41.00	0.8100 SCSTypell,24hr	DR5-5366
DR5-5367#1	0.51	100.00	54.00	1.1500 SCSTypell,24hr	DR5-5367
DR5-5368#1	2.70	315.00	77.00	0.5800 SCSTypell,24hr	DR5-5368
DR5-5388#1	0.86	180.00	23.00	1.7900 SCSTypell,24hr	DR5-5388
Pond#1	8.75	450.00	54.00	1.1300 SCSTypell,24hr	Pond

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Node Summary

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## Briarfield10yrtwExisting-10yr24hr

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
DR5-0474	JUNCTION	4.40	3.20	10000.0	
DR5-0498	JUNCTION	4.07	7.92	10000.0	
DR5-0504	JUNCTION	3.45	6.30	10000.0	
DR5-0524	JUNCTION	6.65	5.05	10000.0	
DR5-0572	JUNCTION	-0.18	8.62	10000.0	
DR5-0584	JUNCTION	1.83	3.10	10000.0	
DR5-0593	JUNCTION	1.03	4.00	10000.0	
DR5-0599	JUNCTION	-0.11	8.08	10000.0	
DR5-0603	JUNCTION	2.25	2.49	10000.0	
DR5-0648	JUNCTION	0.29	6.71	10000.0	
DR5-0661	JUNCTION	5.17	3.55	10000.0	
DR5-0681	JUNCTION	0.57	8.39	10000.0	
DR5-0689	JUNCTION	9.60	6.92	10000.0	
DR5-0690	JUNCTION	9.67	3.44	10000.0	
DR5-0691	JUNCTION	4.37	4.45	10000.0	
DR5-0703	JUNCTION	7.46	5.48	10000.0	
DR5-0704	JUNCTION	7.27	4.00	10000.0	
DR5-0712	JUNCTION	10.34	3.23	10000.0	
DR5-0714	JUNCTION	0.76	8.64	10000.0	
DR5-0715	JUNCTION	8.20	4.80	10000.0	
DR5-0716	JUNCTION	8.30	3.86	10000.0	
DR5-0718	JUNCTION	8.37	3.42	10000.0	
DR5-0724	JUNCTION	1.53	4.15	10000.0	
DR5-0730	JUNCTION	0.69	5.00	10000.0	
DR5-0737	JUNCTION	10.38	4.71	10000.0	
DR5-0738	JUNCTION	3.46	7.54	10000.0	
DR5-0739	JUNCTION	3.28	7.71	10000.0	
DR5-0744	JUNCTION	10.11	3.79	10000.0	
DR5-0751	JUNCTION	3.14	3.50	10000.0	
DR5-0754	JUNCTION	0.98	9.02	10000.0	
DR5-0769	JUNCTION	3.94	4.20	10000.0	
DR5-0772	JUNCTION	5.40	3.60	10000.0	
DR5-0781	JUNCTION	3.85	5.80	10000.0	
DR5-0782	JUNCTION	-0.10	4.74	10000.0	
DR5-0783	JUNCTION	2.44	2.50	10000.0	
DR5-0784	JUNCTION	2.13	7.00	10000.0	
DR5-0790	JUNCTION	3.95	6.05	10000.0	
DR5-0792	JUNCTION	0.09	5.89	10000.0	
DR5-0794	JUNCTION	1.24	7.00	10000.0	
DR5-0800	JUNCTION	4.00	4.00	10000.0	
DR5-0805	JUNCTION	6.38	2.60	10000.0	

## Briarfield10yrtwExisting-10yr24hr

DR5-0806	JUNCTION	6.97	4.85	10000.0
DR5-0808	JUNCTION	7.24	4.59	10000.0
DR5-0809	JUNCTION	4.54	1.73	10000.0
DR5-0810	JUNCTION	1.16	4.86	10000.0
DR5-0814	JUNCTION	9.00	3.07	10000.0
DR5-0818	JUNCTION	7.71	3.57	10000.0
DR5-0830	JUNCTION	3.63	4.00	10000.0
DR5-0833	JUNCTION	8.00	4.00	10000.0
DR5-0840	JUNCTION	7.75	7.47	10000.0
DR5-0841	JUNCTION	5.21	3.23	10000.0
DR5-0852	JUNCTION	8.97	5.93	10000.0
DR5-0855	JUNCTION	5.25	4.00	10000.0
DR5-0858	JUNCTION	9.75	4.00	10000.0
DR5-0867	JUNCTION	7.39	3.70	10000.0
DR5-0868	JUNCTION	7.89	4.44	10000.0
DR5-0873	JUNCTION	4.62	8.35	10000.0
DR5-0874	JUNCTION	7.12	8.18	10000.0
DR5-0875	JUNCTION	6.02	15.69	10000.0
DR5-0876	JUNCTION	10.00	3.00	10000.0
DR5-0888	JUNCTION	8.76	3.24	10000.0
DR5-0889	JUNCTION	9.00	3.00	10000.0
DR5-0896	JUNCTION	6.33	5.67	10000.0
DR5-0898	JUNCTION	5.11	5.36	10000.0
DR5-0907	JUNCTION	4.98	8.14	10000.0
DR5-0914	JUNCTION	5.22	8.07	10000.0
DR5-0916	JUNCTION	6.01	4.40	10000.0
DR5-0925	JUNCTION	5.97	5.03	10000.0
DR5-0932	JUNCTION	9.00	5.83	10000.0
DR5-0936	JUNCTION	5.44	6.60	10000.0
DR5-0939	JUNCTION	2.76	6.00	10000.0
DR5-0942	JUNCTION	7.20	4.80	10000.0
DR5-0947	JUNCTION	5.61	7.39	10000.0
DR5-0949	JUNCTION	7.41	4.59	10000.0
DR5-0951	JUNCTION	7.65	13.89	10000.0
DR5-0958	JUNCTION	7.33	5.50	10000.0
DR5-0966	JUNCTION	6.07	7.83	10000.0
DR5-0973	JUNCTION	6.36	6.64	10000.0
DR5-0981	JUNCTION	3.34	8.33	10000.0
DR5-0983	JUNCTION	6.39	6.61	10000.0
DR5-0988	JUNCTION	6.52	6.48	10000.0
DR5-0991	JUNCTION	6.62	6.48	10000.0
DR5-0992	JUNCTION	6.63	6.76	10000.0
DR5-0998	JUNCTION	3.38	8.33	10000.0
DR5-0999	JUNCTION	3.72	5.49	10000.0

## Briarfield10yrtwExisting-10yr24hr

DR5-1004	JUNCTION	6.82	6.18	10000.0
DR5-1005	JUNCTION	7.50	5.50	10000.0
DR5-1007	JUNCTION	4.12	3.80	10000.0
DR5-1010	JUNCTION	5.99	6.00	10000.0
DR5-1012	JUNCTION	6.04	6.92	10000.0
DR5-1017	JUNCTION	5.82	4.52	10000.0
DR5-1028	JUNCTION	5.65	4.35	10000.0
DR5-1032	JUNCTION	8.97	4.98	10000.0
DR5-1033	JUNCTION	9.18	4.81	10000.0
DR5-1034	JUNCTION	7.35	6.80	10000.0
DR5-1035	JUNCTION	7.67	4.33	10000.0
DR5-1311	JUNCTION	0.14	6.10	10000.0
DR5-1334	JUNCTION	4.37	4.00	10000.0
DR5-1350	JUNCTION	1.40	8.10	10000.0
DR5-1361	JUNCTION	5.70	3.65	10000.0
DR5-1363	JUNCTION	1.70	7.90	10000.0
DR5-1371	JUNCTION	7.80	4.20	10000.0
DR5-1372	JUNCTION	7.33	4.40	10000.0
DR5-1378	JUNCTION	6.78	4.00	10000.0
DR5-1379	JUNCTION	3.28	8.10	10000.0
DR5-1391	JUNCTION	6.28	4.99	10000.0
DR5-1395	JUNCTION	2.48	8.00	10000.0
DR5-1396	JUNCTION	6.93	3.64	10000.0
DR5-1404	JUNCTION	6.14	4.95	10000.0
DR5-1405	JUNCTION	2.78	6.75	10000.0
DR5-1408	JUNCTION	2.95	6.45	10000.0
DR5-1409	JUNCTION	4.39	6.45	10000.0
DR5-1429	JUNCTION	4.55	6.70	10000.0
DR5-1464	JUNCTION	5.78	6.15	10000.0
DR5-1493	JUNCTION	4.20	2.80	10000.0
DR5-1518	JUNCTION	7.03	5.85	10000.0
DR5-1522	JUNCTION	3.48	3.80	10000.0
DR5-1530	JUNCTION	2.79	4.60	10000.0
DR5-1531	JUNCTION	1.14	4.10	10000.0
DR5-1533	JUNCTION	7.90	4.84	10000.0
DR5-1554	JUNCTION	5.10	3.55	10000.0
DR5-1555	JUNCTION	8.58	4.80	10000.0
DR5-1557	JUNCTION	5.22	3.15	10000.0
DR5-1591	JUNCTION	8.76	3.27	10000.0
DR5-1596	JUNCTION	8.62	3.85	10000.0
DR5-1597	JUNCTION	4.05	5.80	10000.0
DR5-1607	JUNCTION	5.40	3.10	10000.0
DR5-1614	JUNCTION	0.60	2.88	10000.0
DR5-1615	JUNCTION	6.50	3.07	10000.0

## Briarfield10yrtwExisting-10yr24hr

DR5-1623	JUNCTION	2.61	4.90	10000.0
DR5-1626	JUNCTION	3.14	4.86	10000.0
DR5-1629	JUNCTION	3.11	6.89	10000.0
DR5-1632	JUNCTION	5.74	6.30	10000.0
DR5-1633	JUNCTION	1.66	2.77	10000.0
DR5-1636	JUNCTION	2.49	2.50	10000.0
DR5-1637	JUNCTION	2.50	2.51	10000.0
DR5-1640	JUNCTION	6.33	5.72	10000.0
DR5-1646	JUNCTION	2.04	8.59	10000.0
DR5-1647	JUNCTION	5.27	2.50	10000.0
DR5-1657	JUNCTION	0.59	6.41	10000.0
DR5-1659	JUNCTION	0.72	6.28	10000.0
DR5-1672	JUNCTION	3.76	8.00	10000.0
DR5-1689	JUNCTION	5.57	3.45	10000.0
DR5-1694	JUNCTION	4.01	4.86	10000.0
DR5-1698	JUNCTION	4.11	4.80	10000.0
DR5-1701	JUNCTION	4.41	7.59	10000.0
DR5-1704	JUNCTION	4.58	8.41	10000.0
DR5-1705	JUNCTION	4.00	5.69	10000.0
DR5-1707	JUNCTION	4.08	5.69	10000.0
DR5-1732	JUNCTION	5.54	5.96	10000.0
DR5-1738	JUNCTION	5.94	7.06	10000.0
DR5-1754	JUNCTION	6.81	5.91	10000.0
DR5-1757	JUNCTION	6.88	5.80	10000.0
DR5-1760	JUNCTION	7.60	4.40	10000.0
DR5-1779	JUNCTION	7.30	5.70	10000.0
DR5-1780	JUNCTION	8.65	5.01	10000.0
DR5-1781	JUNCTION	5.98	6.79	10000.0
DR5-1787	JUNCTION	7.07	6.09	10000.0
DR5-1792	JUNCTION	6.38	5.05	10000.0
DR5-1795	JUNCTION	8.15	5.60	10000.0
DR5-1796	JUNCTION	6.61	6.66	10000.0
DR5-1797	JUNCTION	9.41	3.59	10000.0
DR5-1799	JUNCTION	9.47	3.52	10000.0
DR5-1802	JUNCTION	8.35	5.46	10000.0
DR5-1803	JUNCTION	9.50	4.51	10000.0
DR5-1804	JUNCTION	9.24	4.93	10000.0
DR5-1805	JUNCTION	7.18	6.82	10000.0
DR5-1809	JUNCTION	9.38	3.62	10000.0
DR5-1810	JUNCTION	9.50	3.50	10000.0
DR5-1811	JUNCTION	9.14	3.86	10000.0
DR5-1812	JUNCTION	9.64	3.59	10000.0
DR5-1819	JUNCTION	10.00	4.00	10000.0
DR5-1940	JUNCTION	8.97	5.43	10000.0

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DR5-1943	JUNCTION	1.00	7.00	10000.0
DR5-1955	JUNCTION	1.67	7.33	10000.0
DR5-2033	JUNCTION	2.89	5.35	10000.0
DR5-2087	JUNCTION	7.78	3.97	10000.0
DR5-2091	JUNCTION	7.20	5.80	10000.0
DR5-2092	JUNCTION	8.59	2.91	10000.0
DR5-2096	JUNCTION	3.95	8.15	10000.0
DR5-2097	JUNCTION	3.90	8.20	10000.0
DR5-2192	JUNCTION	3.09	9.25	10000.0
DR5-2221	JUNCTION	6.39	8.16	10000.0
DR5-2239	JUNCTION	-0.18	3.87	10000.0
DR5-2240	JUNCTION	0.60	8.90	10000.0
DR5-2241	JUNCTION	2.99	5.31	10000.0
DR5-2242	JUNCTION	3.44	5.36	10000.0
DR5-2259	JUNCTION	8.09	2.91	10000.0
DR5-2260	JUNCTION	7.91	3.45	10000.0
DR5-2261	JUNCTION	5.32	7.68	10000.0
DR5-2262	JUNCTION	4.93	6.96	10000.0
DR5-2263	JUNCTION	4.68	8.31	10000.0
DR5-2264	JUNCTION	4.54	8.45	10000.0
DR5-2846	JUNCTION	5.34	4.68	10000.0
DR5-2848	JUNCTION	6.00	5.78	10000.0
DR5-2852	JUNCTION	6.00	4.00	10000.0
DR5-2864	JUNCTION	3.25	4.11	10000.0
DR5-2879	JUNCTION	0.50	5.20	10000.0
DR5-2884	JUNCTION	1.92	4.06	10000.0
DR5-2886	JUNCTION	2.83	4.18	10000.0
DR5-2887	JUNCTION	2.26	5.00	10000.0
DR5-2890	JUNCTION	3.38	4.18	10000.0
DR5-2900	JUNCTION	4.49	4.05	10000.0
DR5-2905	JUNCTION	4.36	4.63	10000.0
DR5-2914	JUNCTION	5.49	3.41	10000.0
DR5-2917	JUNCTION	5.37	2.67	10000.0
DR5-3028	JUNCTION	5.00	10.31	10000.0
DR5-3029	JUNCTION	10.50	2.50	10000.0
DR5-3036	JUNCTION	10.00	3.00	10000.0
DR5-3039	JUNCTION	6.29	6.00	10000.0
DR5-3042	JUNCTION	9.04	3.31	10000.0
DR5-3043	JUNCTION	8.24	2.76	10000.0
DR5-3044	JUNCTION	6.55	5.69	10000.0
DR5-3045	JUNCTION	6.87	4.63	10000.0
DR5-3052	JUNCTION	7.07	4.07	10000.0
DR5-3056	JUNCTION	9.50	3.03	10000.0
DR5-3058	JUNCTION	7.91	5.09	10000.0

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DR5-3061	JUNCTION	7.47	4.53	10000.0
DR5-3068	JUNCTION	6.93	5.57	10000.0
DR5-3069	JUNCTION	8.46	2.54	10000.0
DR5-3072	JUNCTION	8.08	3.56	10000.0
DR5-3077	JUNCTION	8.65	3.53	10000.0
DR5-3080	JUNCTION	8.98	3.02	10000.0
DR5-3085	JUNCTION	9.12	4.13	10000.0
DR5-3109	JUNCTION	2.00	7.12	10000.0
DR5-3123	JUNCTION	1.29	4.00	10000.0
DR5-3124	JUNCTION	0.87	4.75	10000.0
DR5-3125	JUNCTION	1.14	4.15	10000.0
DR5-3127	JUNCTION	1.46	3.54	10000.0
DR5-3176	JUNCTION	8.26	5.42	10000.0
DR5-3217	JUNCTION	8.18	4.83	10000.0
DR5-3218	JUNCTION	10.00	3.98	10000.0
DR5-3219	JUNCTION	8.90	5.10	10000.0
DR5-3229	JUNCTION	8.82	3.32	10000.0
DR5-3651	JUNCTION	0.46	7.40	10000.0
DR5-3654	JUNCTION	1.34	7.55	10000.0
DR5-3666	JUNCTION	4.76	5.40	10000.0
DR5-3672	JUNCTION	5.95	3.85	10000.0
DR5-3697	JUNCTION	9.61	2.15	10000.0
DR5-3723	JUNCTION	6.67	3.70	10000.0
DR5-3724	JUNCTION	6.77	4.00	10000.0
DR5-3726	JUNCTION	1.36	8.25	10000.0
DR5-3740	JUNCTION	10.76	2.00	10000.0
DR5-3746	JUNCTION	5.06	6.10	10000.0
DR5-3750	JUNCTION	10.00	2.09	10000.0
DR5-3757	JUNCTION	6.59	5.00	10000.0
DR5-3792	JUNCTION	0.77	3.26	10000.0
DR5-3822	JUNCTION	4.81	6.80	10000.0
DR5-3826	JUNCTION	6.04	3.10	10000.0
DR5-3844	JUNCTION	1.25	8.74	10000.0
DR5-3857	JUNCTION	3.07	3.01	10000.0
DR5-3859	JUNCTION	1.32	8.98	10000.0
DR5-3866	JUNCTION	4.14	4.65	10000.0
DR5-3874	JUNCTION	5.84	2.00	10000.0
DR5-3875	JUNCTION	6.25	2.60	10000.0
DR5-3879	JUNCTION	1.41	4.00	10000.0
DR5-3885	JUNCTION	1.96	5.73	10000.0
DR5-3886	JUNCTION	2.15	5.00	10000.0
DR5-3887	JUNCTION	3.27	4.00	10000.0
DR5-3902	JUNCTION	6.10	3.40	10000.0
DR5-3903	JUNCTION	3.83	6.17	10000.0

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DR5-3905	JUNCTION	6.00	4.74	10000.0
DR5-3911	JUNCTION	6.41	5.44	10000.0
DR5-3914	JUNCTION	9.42	4.40	10000.0
DR5-3916	JUNCTION	4.33	6.57	10000.0
DR5-3926	JUNCTION	6.89	4.55	10000.0
DR5-3932	JUNCTION	6.00	7.00	10000.0
DR5-3934	JUNCTION	6.23	6.77	10000.0
DR5-3938	JUNCTION	7.84	3.25	10000.0
DR5-3961	JUNCTION	8.86	5.13	10000.0
DR5-3966	JUNCTION	7.91	6.09	10000.0
DR5-3968	JUNCTION	9.73	4.27	10000.0
DR5-3971	JUNCTION	9.52	2.48	10000.0
DR5-4196	JUNCTION	1.77	7.95	10000.0
DR5-4206	JUNCTION	6.79	5.75	10000.0
DR5-4218	JUNCTION	2.39	3.30	10000.0
DR5-4222	JUNCTION	2.89	3.15	10000.0
DR5-4224	JUNCTION	1.17	3.83	10000.0
DR5-4225	JUNCTION	3.00	4.43	10000.0
DR5-4230	JUNCTION	1.22	2.25	10000.0
DR5-4236	JUNCTION	7.92	4.25	10000.0
DR5-4281	JUNCTION	2.68	6.32	10000.0
DR5-4282	JUNCTION	2.49	6.51	10000.0
DR5-4293	JUNCTION	4.20	5.90	10000.0
DR5-4298	JUNCTION	4.41	5.85	10000.0
DR5-4302	JUNCTION	6.81	3.19	10000.0
DR5-4305	JUNCTION	7.00	3.16	10000.0
DR5-4307	JUNCTION	8.70	10.34	10000.0
DR5-4310	JUNCTION	5.45	6.19	10000.0
DR5-4311	JUNCTION	5.84	6.66	10000.0
DR5-4314	JUNCTION	6.21	5.79	10000.0
DR5-4315	JUNCTION	6.07	7.10	10000.0
DR5-4317	JUNCTION	7.49	5.51	10000.0
DR5-4323	JUNCTION	6.50	5.48	10000.0
DR5-4327	JUNCTION	8.50	2.97	10000.0
DR5-4328	JUNCTION	8.66	3.04	10000.0
DR5-4343	JUNCTION	7.70	4.30	10000.0
DR5-4344	JUNCTION	5.47	6.46	10000.0
DR5-4345	JUNCTION	4.27	7.11	10000.0
DR5-4351	JUNCTION	3.64	5.06	10000.0
DR5-4355	JUNCTION	5.20	4.20	10000.0
DR5-4356	JUNCTION	4.75	5.05	10000.0
DR5-4357	JUNCTION	4.54	4.78	10000.0
DR5-4358	JUNCTION	4.40	4.92	10000.0
DR5-4360	JUNCTION	2.35	8.60	10000.0

Briarfield10yrtwExisting-10yr24hr

DR5-4633	JUNCTION	4.88	3.05	10000.0
DR5-4634	JUNCTION	0.85	5.10	10000.0
DR5-4657	JUNCTION	5.36	7.10	10000.0
DR5-4658	JUNCTION	7.00	5.29	10000.0
DR5-5300	JUNCTION	10.21	2.05	10000.0
DR5-5354	JUNCTION	5.95	3.25	10000.0
DR5-5364	JUNCTION	6.57	5.70	10000.0
DR5-5365	JUNCTION	6.69	5.05	10000.0
DR5-5366	JUNCTION	6.78	3.75	10000.0
DR5-5367	JUNCTION	6.95	3.75	10000.0
DR5-5368	JUNCTION	7.30	3.15	10000.0
DR5-5388	JUNCTION	3.82	3.60	10000.0
MN01	JUNCTION	5.44	4.00	10000.0
MN02	JUNCTION	4.40	6.10	10000.0
DR5-0506	OUTFALL	4.00	1.25	0.0
DR5-0571	OUTFALL	-0.63	5.50	0.0
DR5-0592	OUTFALL	0.00	2.00	0.0
DR5-0608	OUTFALL	-0.86	2.00	0.0
DR5-0640	OUTFALL	0.00	5.20	0.0
DR5-0642	OUTFALL	0.35	2.50	0.0
DR5-0729	OUTFALL	0.67	5.00	0.0
DR5-0741	OUTFALL	1.68	2.00	0.0
DR5-0774	OUTFALL	0.69	3.00	0.0
DR5-2238	OUTFALL	-1.00	2.00	0.0
DR5-2837	OUTFALL	-0.50	2.00	0.0
DR5-2845	OUTFALL	5.00	2.00	0.0
DR5-2847	OUTFALL	3.00	2.00	0.0
DR5-2863	OUTFALL	2.02	1.67	0.0
DR5-3644	OUTFALL	0.00	4.50	0.0
DR5-3725	OUTFALL	0.69	2.50	0.0
DR5-3791	OUTFALL	0.00	2.00	0.0
DR5-3810	OUTFALL	1.20	2.22	0.0
DR5-3810_1	OUTFALL	1.20	2.00	0.0
DR5-3833	OUTFALL	0.10	2.00	0.0
DR5-3842	OUTFALL	1.53	2.00	0.0
DR5-3845	OUTFALL	-0.42	2.00	0.0
DR5-3849	OUTFALL	-0.38	2.00	0.0
DR5-3856	OUTFALL	-2.06	2.50	0.0
DR5-4635	OUTFALL	0.00	2.00	0.0
DR5-4656	OUTFALL	2.78	2.25	0.0
Pond	STORAGE	0.00	8.00	13591.4

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## Briarfield10yrtwExisting-10yr24hr

## Link Summary

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Name	From Node	To Node	Type	Length	%Slope	Roughness
DR5-0281	DR5-3056	DR5-3069	CONDUIT	279.6	0.3716	0.0130
DR5-0308	DR5-0949	DR5-3926	CONDUIT	117.2	0.4464	0.0400
DR5-0380	DR5-0875	DR5-0896	CONDUIT	152.3	-0.2035	0.0400
DR5-0711	DR5-4360	DR5-1363	CONDUIT	326.4	0.2001	0.0130
DR5-0713	DR5-5388	DR5-4293	CONDUIT	186.9	-0.2033	0.0130
DR5-0715.1	DR5-0751	DR5-0724	CONDUIT	194.2	0.8292	0.0130
DR5-0789	DR5-4657	DR5-4656	CONDUIT	100.4	2.5663	0.0130
DR5-0794.1	DR5-4658	DR5-4657	CONDUIT	64.0	2.5661	0.0130
DR5-0800.1	DR5-1311	DR5-3644	CONDUIT	45.9	0.3048	0.0130
DR5-0827	DR5-0769	DR5-0751	CONDUIT	149.8	0.5339	0.0130
DR5-0830.1	DR5-3916	DR5-1707	CONDUIT	110.4	0.2255	0.0130
DR5-0832	DR5-0907	DR5-0873	CONDUIT	165.0	0.2140	0.0130
DR5-0836	DR5-1372	DR5-1379	CONDUIT	163.1	2.4834	0.0130
DR5-0851	DR5-3666	DR5-0474	CONDUIT	102.6	0.2046	0.0130
DR5-0863.1	DR5-1363	DR5-1350	CONDUIT	84.0	0.3573	0.0130
DR5-0881	DR5-3746	DR5-0504	CONDUIT	312.4	0.5154	0.0130
DR5-0882	DR5-0504	DR5-1408	CONDUIT	49.1	1.0194	0.0130
DR5-0886	DR5-3792	DR5-3791	CONDUIT	166.2	0.4651	0.0130
DR5-0894	DR5-4206	DR5-1464	CONDUIT	216.8	0.4659	0.0130
DR5-0922	DR5-1518	DR5-4206	CONDUIT	225.8	0.1063	0.0130
DR5-0925.1	DR5-1493	DR5-1522	CONDUIT	268.8	0.2679	0.0130
DR5-0932.1	DR5-1522	DR5-1530	CONDUIT	45.3	1.5247	0.0130
DR5-0934	DR5-4224	DR5-0593	CONDUIT	165.3	0.0871	0.0130
DR5-0941	DR5-4230	DR5-4224	CONDUIT	52.7	0.0873	0.0130
DR5-0946	DR5-4236	DR5-1533	CONDUIT	146.9	0.0136	0.0130
DR5-0959	DR5-3124	DR5-2879	CONDUIT	14.4	2.5721	0.0130
DR5-0960	DR5-3125	DR5-3124	CONDUIT	86.8	0.3112	0.0130
DR5-0966.1	DR5-0648	DR5-0599	CONDUIT	336.6	0.1185	0.0130
DR5-0973.1	DR5-1555	DR5-4236	CONDUIT	246.2	0.2681	0.0130
DR5-0979	DR5-1557	DR5-3822	CONDUIT	157.4	0.2631	0.0130
DR5-0985	DR5-2886	DR5-3127	CONDUIT	174.1	0.7906	0.0130
DR5-0987	DR5-2887	DR5-2884	CONDUIT	138.9	0.2441	0.0130
DR5-1000	DR5-0681	DR5-0648	CONDUIT	237.6	0.1183	0.0130
DR5-1012.1	DR5-0690	DR5-0689	CONDUIT	85.1	0.0881	0.0130
DR5-1013	DR5-0689	DR5-1555	CONDUIT	191.1	0.5311	0.0130
DR5-1014	DR5-3822	DR5-0691	CONDUIT	166.0	0.2627	0.0130
DR5-1016	DR5-2890	DR5-2886	CONDUIT	175.6	0.3122	0.0130
DR5-1032.1	DR5-2900	DR5-2886	CONDUIT	209.7	0.7908	0.0130
DR5-1034.1	DR5-0703	DR5-0704	CONDUIT	99.4	0.1951	0.0400
DR5-1041	DR5-0712	DR5-0689	CONDUIT	140.3	0.5311	0.0130

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DR5-1044	DR5-0714	DR5-0681	CONDUIT	198.0	0.0934	0.0130
DR5-1045	DR5-1591	DR5-1596	CONDUIT	74.8	0.1870	0.0130
DR5-1046	DR5-0715	DR5-0703	CONDUIT	379.8	0.1943	0.0130
DR5-1048	DR5-0716	DR5-0715	CONDUIT	52.0	0.1941	0.0130
DR5-1049	DR5-0737	DR5-0712	CONDUIT	140.0	0.0250	0.0130
DR5-1050	DR5-0718	DR5-0716	CONDUIT	32.1	0.1929	0.0130
DR5-1051	DR5-1596	DR5-0718	CONDUIT	131.1	0.1945	0.0130
DR5-1058	DR5-0724	DR5-0642	CONDUIT	525.1	0.2247	0.0130
DR5-1067	DR5-1796	DR5-4323	CONDUIT	147.3	0.0767	0.0130
DR5-1069	DR5-3069	DR5-3072	CONDUIT	103.2	0.3720	0.0130
DR5-1070	DR5-3072	DR5-3061	CONDUIT	242.4	0.2504	0.0130
DR5-1088	DR5-4282	DR5-0741	CONDUIT	169.8	0.4752	0.0130
DR5-1091	DR5-0744	DR5-0737	CONDUIT	39.4	-0.6733	0.0130
DR5-1094	DR5-2917	DR5-2900	CONDUIT	242.4	0.3631	0.0130
DR5-1098	DR5-4293	DR5-4298	CONDUIT	39.3	-0.5341	0.0130
DR5-1101	DR5-1657	DR5-0792	CONDUIT	140.8	0.3529	0.0130
DR5-1104	DR5-1707	DR5-1705	CONDUIT	46.8	0.1710	0.0130
DR5-1111	DR5-0914	DR5-0907	CONDUIT	113.8	0.2145	0.0130
DR5-1119	DR5-1754	DR5-0991	CONDUIT	100.3	0.1944	0.0130
DR5-1120	DR5-3966	DR5-4317	CONDUIT	268.2	0.1566	0.0130
DR5-1121	DR5-3068	DR5-4315	CONDUIT	277.2	0.3117	0.0130
DR5-1127	DR5-1607	DR5-3826	CONDUIT	154.0	-0.4157	0.0130
DR5-1137	DR5-1614	DR5-3833	CONDUIT	55.0	0.9131	0.0130
DR5-1146	DR5-1623	DR5-0774	CONDUIT	125.7	1.5271	0.0130
DR5-1149	DR5-3859	DR5-3844	CONDUIT	69.4	0.0936	0.0130
DR5-1155	DR5-1637	DR5-1633	CONDUIT	49.5	1.7077	0.0130
DR5-1164	DR5-1646	DR5-3859	CONDUIT	135.7	0.5343	0.0130
DR5-1176	DR5-0806	DR5-0805	CONDUIT	102.6	0.5738	0.0130
DR5-1181	DR5-0833	DR5-0818	CONDUIT	86.2	0.3352	0.0130
DR5-1187	DR5-0814	DR5-0840	CONDUIT	153.1	0.8140	0.0130
DR5-1196	DR5-3905	DR5-0855	CONDUIT	157.2	0.4771	0.0130
DR5-1197	DR5-3902	DR5-3905	CONDUIT	19.2	0.5205	0.0130
DR5-1201	DR5-3911	DR5-3905	CONDUIT	31.3	1.3025	0.0130
DR5-1205	DR5-0876	DR5-0852	CONDUIT	180.1	0.5735	0.0130
DR5-1208	DR5-0868	DR5-0867	CONDUIT	175.4	0.2851	0.0130
DR5-1212	DR5-0932	DR5-3926	CONDUIT	211.9	0.7373	0.0130
DR5-1213	DR5-0942	DR5-2221	CONDUIT	127.9	0.6351	0.0130
DR5-1217	DR5-4305	DR5-4302	CONDUIT	47.3	0.3956	0.0130
DR5-1218	DR5-0966	DR5-1738	CONDUIT	93.3	0.1425	0.0130
DR5-1228	DR5-0983	DR5-3932	CONDUIT	198.9	0.1940	0.0130
DR5-1233	DR5-0992	DR5-0988	CONDUIT	76.4	0.1439	0.0130
DR5-1236	DR5-3044	DR5-3039	CONDUIT	174.5	0.1490	0.0130
DR5-1240	DR5-3961	DR5-1780	CONDUIT	190.5	0.1081	0.0130
DR5-1244	DR5-3061	DR5-3052	CONDUIT	158.6	0.2509	0.0130

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DR5-1253	DR5-3217	DR5-3068	CONDUIT	398.0	0.3118	0.0130
DR5-1255	DR5-3229	DR5-3219	CONDUIT	109.8	-0.0719	0.0130
DR5-1304	DR5-1940	DR5-3085	CONDUIT	63.3	-0.2371	0.0130
DR5-1305	DR5-3219	DR5-1940	CONDUIT	99.9	-0.0711	0.0130
DR5-1307	DR5-2092	DR5-2091	CONDUIT	22.0	6.3279	0.0100
DR5-1314	DR5-2091	DR5-2096	CONDUIT	23.0	14.2673	0.0130
DR5-1414	DR5-4298	DR5-0781	CONDUIT	353.6	0.1584	0.0120
DR5-1584	DR5-3109	DR5-2837	CONDUIT	97.8	2.5570	0.0130
DR5-1591.1	DR5-2848	DR5-2847	CONDUIT	87.0	3.4522	0.0130
DR5-1600	DR5-2864	DR5-2863	CONDUIT	169.2	0.7288	0.0130
DR5-1603	DR5-1391	DR5-1361	CONDUIT	268.2	0.2163	0.0130
DR5-1606	DR5-3127	DR5-3125	CONDUIT	40.0	0.7910	0.0130
DR5-1609	DR5-0474	DR5-2864	CONDUIT	178.1	0.7284	0.0130
DR5-1616	DR5-3672	DR5-3666	CONDUIT	55.8	2.1346	0.0130
DR5-1619	DR5-1361	DR5-5354	CONDUIT	36.3	-0.6897	0.0130
DR5-1634	DR5-3757	DR5-1391	CONDUIT	168.8	0.1837	0.0130
DR5-1637.1	DR5-0498	DR5-1379	CONDUIT	244.6	0.3229	0.0130
DR5-1670	DR5-1533	DR5-1518	CONDUIT	77.9	1.1174	0.0130
DR5-1672.1	DR5-4222	DR5-4218	CONDUIT	45.0	1.1108	0.0130
DR5-1692	DR5-0999	DR5-0998	CONDUIT	160.5	0.2118	0.0130
DR5-1694.1	DR5-0783	DR5-3842	CONDUIT	121.6	0.7451	0.0130
DR5-1703	DR5-1659	DR5-1657	CONDUIT	39.1	0.3531	0.0130
DR5-1706	DR5-1672	DR5-1646	CONDUIT	320.7	0.5348	0.0130
DR5-1710	DR5-0818	DR5-0808	CONDUIT	139.3	0.3352	0.0130
DR5-1712	DR5-1689	DR5-0841	CONDUIT	160.4	0.2238	0.0130
DR5-1715	DR5-1694	DR5-3887	CONDUIT	265.4	0.2788	0.0130
DR5-1724	DR5-4310	DR5-3916	CONDUIT	496.3	0.2259	0.0130
DR5-1727	DR5-0873	DR5-1704	CONDUIT	21.6	0.2174	0.0130
DR5-1732.1	DR5-0958	DR5-4305	CONDUIT	166.9	0.1959	0.0130
DR5-1736	DR5-2221	DR5-0936	CONDUIT	149.1	0.6357	0.0130
DR5-1742	DR5-3932	DR5-1732	CONDUIT	235.8	0.1943	0.0130
DR5-1743	DR5-3934	DR5-0966	CONDUIT	113.5	0.1436	0.0130
DR5-1745	DR5-3176	DR5-1005	CONDUIT	58.7	1.2950	0.0130
DR5-1747	DR5-3029	DR5-3036	CONDUIT	59.5	0.8398	0.0130
DR5-1755	DR5-0988	DR5-0973	CONDUIT	114.6	0.1431	0.0130
DR5-1758	DR5-1005	DR5-1004	CONDUIT	29.4	2.2977	0.0130
DR5-1759	DR5-1757	DR5-1754	CONDUIT	50.4	-0.2977	0.0130
DR5-1762	DR5-1760	DR5-1757	CONDUIT	184.8	0.0649	0.0130
DR5-1764	DR5-1012	DR5-1010	CONDUIT	63.1	0.0761	0.0130
DR5-1772	DR5-4315	DR5-4311	CONDUIT	90.4	0.2601	0.0130
DR5-1778	DR5-3058	DR5-3044	CONDUIT	329.8	0.4108	0.0130
DR5-1781.1	DR5-4323	DR5-1792	CONDUIT	151.6	0.0765	0.0130
DR5-1786	DR5-1799	DR5-1797	CONDUIT	55.4	0.1083	0.0130
DR5-1787.1	DR5-3968	DR5-1799	CONDUIT	235.0	0.1081	0.0130

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DR5-1791	DR5-3218	DR5-3968	CONDUIT	250.6	0.1081	0.0130
DR5-1793	DR5-1810	DR5-1809	CONDUIT	23.1	0.5072	0.0130
DR5-1794	DR5-1809	DR5-1811	CONDUIT	47.1	0.5055	0.0130
DR5-1795.1	DR5-1811	DR5-1802	CONDUIT	259.4	0.3065	0.0130
DR5-1796.1	DR5-3085	DR5-3217	CONDUIT	302.9	0.3120	0.0130
DR5-1835	DR5-2261	DR5-2262	CONDUIT	131.1	0.2976	0.0100
DR5-1838	DR5-4343	DR5-4344	CONDUIT	183.7	1.2140	0.0100
DR5-1839	DR5-2259	DR5-4343	CONDUIT	11.0	3.5584	0.0130
DR5-1840	DR5-2260	DR5-4343	CONDUIT	21.8	0.9453	0.0130
DR5-1868	DR5-1943	DR5-2239	CONDUIT	218.3	0.5406	0.0130
DR5-1871	DR5-2240	Pond	CONDUIT	73.0	0.3012	0.0130
DR5-1872	DR5-1955	DR5-2240	CONDUIT	328.9	0.3254	0.0130
DR5-1998	DR5-2033	DR5-4633	CONDUIT	131.3	-1.5156	0.0130
DR5-1999	DR5-4634	DR5-4635	CONDUIT	121.0	0.7023	0.0130
DR5-2129	DR5-0852	DR5-0806	CONDUIT	348.8	0.5731	0.0130
DR5-2241.1	DR5-2262	DR5-2263	CONDUIT	221.9	0.1131	0.0100
DR5-2242.1	DR5-2264	DR5-4345	CONDUIT	241.5	0.1130	0.0100
DR5-2288	DR5-0781	DR5-0784	CONDUIT	352.4	0.4880	0.0130
DR5-2289	DR5-1633	DR5-3845	CONDUIT	121.6	1.7067	0.0130
DR5-2303	DR5-0809	DR5-0810	CONDUIT	33.8	4.6448	0.0130
DR5-2308	DR5-1704	DR5-1701	CONDUIT	78.8	0.2146	0.0130
DR5-2309	DR5-1705	DR5-3903	CONDUIT	127.7	0.1355	0.0130
DR5-2313	DR5-3938	DR5-0958	CONDUIT	261.2	0.1964	0.0130
DR5-2328	DR5-4355	DR5-4356	CONDUIT	129.1	0.3487	0.0130
DR5-2331	DR5-2239	DR5-2238	CONDUIT	152.5	0.5378	0.0130
DR5-2370	DR5-1698	DR5-1694	CONDUIT	55.2	0.1811	0.0130
DR5-2378	DR5-1780	DR5-1757	CONDUIT	308.1	0.5421	0.0130
DR5-2404	DR5-0841	DR5-3866	CONDUIT	477.9	0.2237	0.0120
DR5-2430	DR5-1636	DR5-1614	CONDUIT	206.5	0.9142	0.0130
DR5-2447	DR5-1732	DR5-4310	CONDUIT	47.7	0.1930	0.0130
DR5-2512	DR5-2263	DR5-2264	CONDUIT	120.6	0.1127	0.0100
DR5-2513	DR5-2241	DR5-1955	CONDUIT	225.9	0.5844	0.0130
DR5-2531	DR5-1404	DR5-3746	CONDUIT	70.7	1.5269	0.0130
DR5-2534	DR5-3866	DR5-0790	CONDUIT	85.3	0.2240	0.0130
DR5-2563	DR5-1797	DR5-1033	CONDUIT	220.0	0.1082	0.0130
DR5-2572	DR5-0593	DR5-0592	CONDUIT	161.9	0.6363	0.0130
DR5-2691	DR5-4344	DR5-2261	CONDUIT	50.2	0.2987	0.0100
DR5-2710	DR5-3740	DR5-5300	CONDUIT	176.0	0.3125	0.0120
DR5-2727	DR5-0810	DR5-1659	CONDUIT	123.6	0.3526	0.0130
DR5-2736	DR5-1004	DR5-0992	CONDUIT	124.0	0.1565	0.0130
DR5-2737	DR5-1802	DR5-3966	CONDUIT	279.7	0.1566	0.0130
DR5-2744	DR5-4633	DR5-4634	CONDUIT	177.9	2.2659	0.0130
DR5-2746	DR5-4196	DR5-1350	CONDUIT	211.5	0.1749	0.0130
DR5-2747	DR5-1371	DR5-1372	CONDUIT	80.4	0.5843	0.0130

## Briarfield10yrtwExisting-10yr24hr

DR5-2792	DR5-0973	DR5-3934	CONDUIT	86.6	0.1433	0.0130
DR5-2801	DR5-0790	DR5-0781	CONDUIT	45.3	0.2231	0.0130
DR5-2804	DR5-1819	DR5-1811	CONDUIT	278.8	0.3067	0.0130
DR5-2834	DR5-0991	DR5-0983	CONDUIT	118.5	0.1933	0.0130
DR5-2837.1	DR5-4356	DR5-4357	CONDUIT	60.3	0.3483	0.0130
DR5-2839	DR5-1395	DR5-4196	CONDUIT	287.8	0.2467	0.0130
DR5-2871	DR5-0898	DR5-1698	CONDUIT	251.7	0.3953	0.0130
DR5-2880	DR5-0730	DR5-0729	CONDUIT	65.6	0.0305	0.0130
DR5-2884.1	DR5-3971	DR5-3080	CONDUIT	213.6	0.2505	0.0130
DR5-2885	DR5-3080	DR5-3077	CONDUIT	132.6	0.2504	0.0130
DR5-2886.1	DR5-3077	DR5-3072	CONDUIT	227.9	0.2505	0.0130
DR5-2961	DR5-4328	DR5-4327	CONDUIT	39.5	0.4100	0.0130
DR5-2962	DR5-1804	DR5-1795	CONDUIT	333.5	0.3280	0.0130
DR5-2968	DR5-2192	DR5-3726	CONDUIT	206.0	0.7715	0.0130
DR5-2976	DR5-3042	DR5-3043	CONDUIT	60.9	1.3134	0.0130
DR5-3011	DR5-1554	DR5-1557	CONDUIT	42.2	-0.2847	0.0130
DR5-3017	DR5-0754	DR5-0714	CONDUIT	244.5	0.0933	0.0130
DR5-3129	DR5-0572	DR5-0571	CONDUIT	113.8	0.4041	0.0130
DR5-3144	DR5-1626	DR5-1623	CONDUIT	34.8	1.5282	0.0130
DR5-3162	DR5-3045	DR5-3044	CONDUIT	173.7	0.1209	0.0130
DR5-3172	DR5-4281	DR5-4282	CONDUIT	39.8	0.4752	0.0130
DR5-3175	DR5-1779	DR5-1004	CONDUIT	301.3	0.1566	0.0130
DR5-3179	DR5-0772	DR5-0769	CONDUIT	26.3	5.5665	0.0130
DR5-3255	DR5-4357	DR5-4358	CONDUIT	33.2	0.4214	0.0130
DR5-3256	DR5-4358	DR5-4351	CONDUIT	319.8	0.2377	0.0130
DR5-3339	DR5-3697	DR5-1371	CONDUIT	35.2	5.1508	0.0130
DR5-3373	DR5-0661	DR5-1554	CONDUIT	157.2	0.0445	0.0130
DR5-3405	DR5-0889	DR5-0888	CONDUIT	25.2	0.9520	0.0130
DR5-3448	DR5-3857	DR5-3856	CONDUIT	105.0	4.8922	0.0130
DR5-3450	DR5-0782	DR5-3849	CONDUIT	108.7	0.2576	0.0130
DR5-3451	DR5-1647	DR5-1626	CONDUIT	139.5	1.5276	0.0130
DR5-3456	DR5-0925	DR5-0898	CONDUIT	219.4	0.3957	0.0130
DR5-3508	DR5-2242	DR5-2241	CONDUIT	99.8	0.4508	0.0130
DR5-3703	DR5-2846	DR5-2845	CONDUIT	44.3	0.7793	0.0130
DR5-3733	DR5-3651	DR5-1311	CONDUIT	162.6	0.1968	0.0130
DR5-3754	DR5-3726	DR5-3725	CONDUIT	87.1	0.7717	0.0130
DR5-3757.1	DR5-1405	DR5-4360	CONDUIT	213.3	0.2002	0.0130
DR5-3759	DR5-1409	DR5-1395	CONDUIT	214.1	0.8921	0.0130
DR5-3775	DR5-0584	DR5-3792	CONDUIT	227.0	0.4656	0.0130
DR5-3777	DR5-0524	DR5-3757	CONDUIT	209.4	0.0287	0.0130
DR5-3792.1	DR5-1531	DR5-0608	CONDUIT	172.1	1.1620	0.0130
DR5-3793	DR5-4225	DR5-0603	CONDUIT	65.8	1.1398	0.0130
DR5-3795	DR5-3123	DR5-3810_1	CONDUIT	210.2	0.0428	0.0130
DR5-3820	DR5-2905	DR5-2890	CONDUIT	138.6	0.7042	0.0130

## Briarfield10yrtwExisting-10yr24hr

DR5-3824	DR5-0738	DR5-0739	CONDUIT	37.3	0.4749	0.0130
DR5-3834.1	DR5-1795	DR5-1787	CONDUIT	328.3	0.3278	0.0130
DR5-3839	DR5-1629	DR5-3859	CONDUIT	151.4	1.1814	0.0130
DR5-3842.1	DR5-1640	DR5-1632	CONDUIT	69.4	0.8506	0.0130
DR5-3847	DR5-0888	DR5-3911	CONDUIT	180.8	1.3013	0.0130
DR5-3851	DR5-0800	DR5-3879	CONDUIT	43.4	5.9758	0.0130
DR5-3854	DR5-3886	DR5-3885	CONDUIT	27.8	0.6827	0.0130
DR5-3866.1	DR5-0858	DR5-3914	CONDUIT	102.0	0.3236	0.0130
DR5-3867	DR5-0874	DR5-0875	CONDUIT	221.8	0.4960	0.0130
DR5-3869	DR5-0947	DR5-0914	CONDUIT	269.4	0.1433	0.0130
DR5-3883	DR5-0951	DR5-0949	CONDUIT	53.8	0.4458	0.0130
DR5-3886.1	DR5-4307	DR5-0951	CONDUIT	97.3	1.0787	0.0130
DR5-3897	DR5-1781	DR5-1017	CONDUIT	50.0	0.3277	0.0130
DR5-3901	DR5-4314	DR5-1012	CONDUIT	222.4	0.0765	0.0130
DR5-3908	DR5-1032	DR5-3961	CONDUIT	107.1	0.1083	0.0130
DR5-3913	DR5-1803	DR5-1033	CONDUIT	180.2	0.1793	0.0130
DR5-3914.1	DR5-1034	DR5-1805	CONDUIT	68.8	0.2456	0.0130
DR5-3915	DR5-1803	DR5-1034	CONDUIT	61.8	3.4849	0.0130
DR5-3949	DR5-4351	DR5-2242	CONDUIT	52.6	0.3799	0.0130
DR5-3963	DR5-1334	DR5-2033	CONDUIT	53.9	2.7485	0.0130
DR5-4094	DR5-1805	DR5-1796	CONDUIT	231.1	0.2453	0.0130
DR5-4201	DR5-1033	DR5-1032	CONDUIT	190.1	0.1078	0.0130
DR5-4202	DR5-1615	DR5-0772	CONDUIT	145.2	0.7578	0.0130
DR5-4205	DR5-3844	DR5-0754	CONDUIT	292.3	0.0931	0.0130
DR5-4223	DR5-0739	DR5-4281	CONDUIT	127.7	0.4755	0.0130
DR5-4224.1	DR5-2914	DR5-2905	CONDUIT	161.0	0.7046	0.0130
DR5-4227	DR5-1597	DR5-0738	CONDUIT	124.1	0.4755	0.0130
DR5-4229	DR5-3875	DR5-3874	CONDUIT	41.1	0.9987	0.0130
DR5-4232	DR5-0808	DR5-1640	CONDUIT	272.9	0.3349	0.0130
DR5-4271	DR5-3903	DR5-0830	CONDUIT	145.1	0.1358	0.0130
DR5-4274	DR5-0896	DR5-0916	CONDUIT	277.4	0.1153	0.0130
DR5-4300	DR5-1738	DR5-0947	CONDUIT	229.7	0.1436	0.0130
DR5-4310.1	DR5-2884	DR5-3123	CONDUIT	258.1	0.2445	0.0130
DR5-4314.1	DR5-1632	DR5-1629	CONDUIT	222.8	1.1816	0.0130
DR5-4323.1	DR5-2879	DR5-0640	CONDUIT	545.4	0.0917	0.0180
DR5-4337	DR5-2852	DR5-2846	CONDUIT	84.0	0.7797	0.0130
DR5-4342	DR5-3826	DR5-0772	CONDUIT	132.9	0.4815	0.0130
DR5-4356.1	DR5-0792	DR5-0782	CONDUIT	53.4	0.3538	0.0130
DR5-4399	DR5-4302	DR5-0925	CONDUIT	212.6	0.3952	0.0130
DR5-4431	DR5-1350	DR5-3654	CONDUIT	159.1	0.0377	0.0130
DR5-4437	DR5-3028	DR5-1007	CONDUIT	58.0	1.5164	0.0130
DR5-4470	DR5-4311	DR5-1028	CONDUIT	71.0	0.2605	0.0130
DR5-4472	DR5-4317	DR5-1779	CONDUIT	125.5	0.1561	0.0130
DR5-4473	DR5-3052	DR5-3045	CONDUIT	80.8	0.2500	0.0130

## Briarfield10yrtwExisting-10yr24hr

DR5-4474	DR5-1787	DR5-1781	CONDUIT	331.1	0.3280	0.0130
DR5-4477	DR5-1792	DR5-4314	CONDUIT	225.6	0.0767	0.0130
DR5-4511	DR5-1035	DR5-1034	CONDUIT	131.8	0.2458	0.0130
DR5-4513	DR5-1812	DR5-3971	CONDUIT	50.0	0.2498	0.0130
DR5-4522	DR5-3750	DR5-3697	CONDUIT	261.3	0.1492	0.0120
DR5-4536	DR5-1379	DR5-2192	CONDUIT	36.0	0.5271	0.0130
DR5-4557	DR5-1408	DR5-1405	CONDUIT	75.9	0.2241	0.0130
DR5-4561	DR5-1429	DR5-1409	CONDUIT	151.1	0.1059	0.0130
DR5-4661	DR5-1530	DR5-1531	CONDUIT	391.7	0.4212	0.0130
DR5-4674	DR5-4218	DR5-0584	CONDUIT	158.9	0.3523	0.0130
DR5-4681	DR5-2087	DR5-2091	CONDUIT	145.0	0.4001	0.0100
DR5-5148	DR5-1378	DR5-3723	CONDUIT	27.3	0.4035	0.0130
DR5-5149	DR5-3724	DR5-1396	CONDUIT	26.4	-0.6051	0.0130
DR5-5150	DR5-1396	DR5-1378	CONDUIT	15.6	0.9613	0.0130
DR5-5153	DR5-5300	DR5-1372	CONDUIT	23.0	12.6350	0.0130
DR5-5154	DR5-3723	DR5-0506	CONDUIT	36.0	7.4407	0.0130
DR5-5181	DR5-5354	DR5-3672	CONDUIT	15.3	0.0065	0.0130
DR5-5207	DR5-5364	DR5-4206	CONDUIT	9.1	-2.4101	0.0130
DR5-5210	DR5-5365	DR5-4206	CONDUIT	17.5	-0.5705	0.0130
DR5-5211	DR5-5366	DR5-5365	CONDUIT	107.2	0.0840	0.0130
DR5-5213	DR5-5367	DR5-5366	CONDUIT	146.8	0.1158	0.0130
DR5-5214	DR5-5368	DR5-5367	CONDUIT	52.5	0.6672	0.0130
DR5-5224	DR5-3654	DR5-3651	CONDUIT	96.2	0.9144	0.0130
Link3595	DR5-0691	DR5-5388	CONDUIT	148.6	0.3701	0.0130
Link3597	DR5-0603	DR5-3810	CONDUIT	132.7	0.6255	0.0180
MN01.1	DR5-0704	DR5-0498	CONDUIT	1646.9	0.1943	0.0400
MN02.1	DR5-3036	DR5-3042	CONDUIT	110.0	0.8726	0.0250
MN03.1	DR5-3043	DR5-2260	CONDUIT	35.3	0.9452	0.0300
MN04.1	DR5-1010	DR5-0981	CONDUIT	839.1	0.3164	0.0400
MN05.1	DR5-0998	DR5-0981	CONDUIT	54.5	0.0826	0.0400
MN06.1	DR5-0867	DR5-0874	CONDUIT	18.3	1.4763	0.0400
MN07.1	DR5-0840	DR5-0874	CONDUIT	77.9	0.8143	0.0400
MN08.1	DR5-0981	DR5-0939	CONDUIT	686.5	0.0835	0.0400
MN09.1	DR5-0599	DR5-0572	CONDUIT	165.1	0.0363	0.0130
MN10.1	DR5-0805	DR5-3875	CONDUIT	22.5	0.5728	0.0250
MN11.1	DR5-3874	DR5-1647	CONDUIT	27.3	2.0922	0.0350
MN12.1	DR5-1701	DR5-2096	CONDUIT	213.4	0.2142	0.0130
MN13.1	DR5-2096	DR5-2097	CONDUIT	6.9	0.7230	0.0130
MN14.1	DR5-2097	DR5-1672	CONDUIT	91.8	0.1525	0.0130
MN15	DR5-1028	MN01	CONDUIT	72.6	0.2907	0.0400
MN16	DR5-1017	MN01	CONDUIT	41.3	0.9220	0.0400
MN17	DR5-3039	MN02	CONDUIT	58.8	3.2096	0.0250
MN18	MN01	MN02	CONDUIT	357.2	0.2900	0.0400
MN19	DR5-1007	DR5-0999	CONDUIT	26.4	1.5191	0.0400

Briarfield10yrtwExisting-10yr24hr

MN20	MN02	DR5-0999	CONDUIT	235.5	0.2900	0.0400
MN22	DR5-3926	DR5-4345	CONDUIT	586.9	0.4459	0.0400
MN23	DR5-4345	DR5-0999	CONDUIT	1470.1	0.0374	0.0400
MN24	DR5-0939	DR5-0784	CONDUIT	1228.8	0.0514	0.0400
MN26	DR5-0784	DR5-0794	CONDUIT	603.0	0.1484	0.0400
MN27	DR5-0794	DR5-0730	CONDUIT	654.1	0.0833	0.0350
MN31	DR5-0855	DR5-0830	CONDUIT	338.6	0.4784	0.0350
MN33	DR5-0830	DR5-3887	CONDUIT	555.5	0.0648	0.0350
MN35	DR5-3887	DR5-3886	CONDUIT	31.1	3.6089	0.0350
MN37	DR5-3879	DR5-0794	CONDUIT	168.4	0.1051	0.0350
MN38	DR5-3885	DR5-3879	CONDUIT	520.5	0.1053	0.0350
MN41	DR5-0916	DR5-0936	CONDUIT	127.6	0.4469	0.0400
MN42	DR5-3914	DR5-0916	CONDUIT	403.9	0.8442	0.0400
MN43	DR5-0936	DR5-0981	CONDUIT	1515.5	0.1389	0.0400
MN44	DR5-4327	DR5-3058	CONDUIT	144.4	0.4108	0.0130
MN45	DR5-1464	DR5-1429	CONDUIT	217.6	0.5653	0.0130
TownPark	Pond	DR5-1943	WEIR			

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Cross Section Summary

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Conduit	Shape	Full Depth	Full Hyd.	Max. Area	No. of Rad.	Width Barrels	Full Flow
DR5-0281	CIRCULAR	2.00	3.14	0.50	2.00	1	13.79
DR5-0308	TRAPEZOIDAL	2.00	37.88	1.37	27.18	1	115.95
DR5-0380	TRAPEZOIDAL	3.80	82.39	2.43	32.66	1	249.36
DR5-0711	CIRCULAR	3.50	9.62	0.88	3.50	1	45.00
DR5-0713	CIRCULAR	3.00	7.07	0.75	3.00	1	30.07
DR5-0715.1	CIRCULAR	2.50	4.91	0.63	2.50	1	37.35
DR5-0789	CIRCULAR	2.25	3.98	0.56	2.25	1	49.61
DR5-0794.1	CIRCULAR	2.00	3.14	0.50	2.00	1	36.24
DR5-0800.1	CIRCULAR	4.50	15.90	1.13	4.50	1	108.57
DR5-0827	CIRCULAR	2.50	4.91	0.63	2.50	1	29.97
DR5-0830.1	CIRCULAR	4.00	12.57	1.00	4.00	1	68.21
DR5-0832	CIRCULAR	4.00	12.57	1.00	4.00	1	66.45
DR5-0836	CIRCULAR	1.50	1.77	0.38	1.50	1	16.55
DR5-0851	CIRCULAR	2.00	3.14	0.50	2.00	1	10.23
DR5-0863.1	CIRCULAR	3.50	9.62	0.88	3.50	1	60.14
DR5-0881	CIRCULAR	2.00	3.14	0.50	2.00	1	16.24
DR5-0882	CIRCULAR	2.50	4.91	0.63	2.50	1	41.41
DR5-0886	CIRCULAR	2.00	3.14	0.50	2.00	1	15.43
DR5-0894	CIRCULAR	3.00	7.07	0.75	3.00	1	45.52

## Briarfield10yrtwExisting-10yr24hr

DR5-0922	CIRCULAR	3.00	7.07	0.75	3.00	1	21.74
DR5-0925.1	CIRCULAR	2.00	3.14	0.50	2.00	1	11.71
DR5-0932.1	CIRCULAR	2.00	3.14	0.50	2.00	1	27.93
DR5-0934	CIRCULAR	2.00	3.14	0.50	2.00	1	6.68
DR5-0941	CIRCULAR	2.00	3.14	0.50	2.00	1	6.68
DR5-0946	CIRCULAR	3.00	7.07	0.75	3.00	1	7.78
DR5-0959	CIRCULAR	2.50	4.91	0.63	2.50	1	65.78
DR5-0960	CIRCULAR	2.50	4.91	0.63	2.50	1	22.88
DR5-0966.1	CIRCULAR	4.42	15.32	1.10	4.42	1	64.42
DR5-0973.1	CIRCULAR	2.50	4.91	0.63	2.50	1	21.24
DR5-0979	CIRCULAR	2.50	4.91	0.63	2.50	1	21.04
DR5-0985	CIRCULAR	2.50	4.91	0.63	2.50	1	36.47
DR5-0987	CIRCULAR	2.00	3.14	0.50	2.00	1	11.18
DR5-1000	CIRCULAR	4.42	15.32	1.10	4.42	1	64.35
DR5-1012.1	CIRCULAR	2.00	3.14	0.50	2.00	1	6.72
DR5-1013	CIRCULAR	2.50	4.91	0.63	2.50	1	29.89
DR5-1014	CIRCULAR	3.00	7.07	0.75	3.00	1	34.18
DR5-1016	CIRCULAR	2.67	5.59	0.67	2.67	1	27.23
DR5-1032.1	CIRCULAR	2.00	3.14	0.50	2.00	1	20.12
DR5-1034.1	TRAPEZOIDAL	2.00	16.00	1.09	14.00	1	27.85
DR5-1041	CIRCULAR	2.00	3.14	0.50	2.00	1	16.49
DR5-1044	CIRCULAR	5.50	23.76	1.38	5.50	1	102.65
DR5-1045	CIRCULAR	2.00	3.14	0.50	2.00	1	9.78
DR5-1046	CIRCULAR	2.00	3.14	0.50	2.00	1	9.97
DR5-1048	CIRCULAR	2.00	3.14	0.50	2.00	1	9.97
DR5-1049	CIRCULAR	2.00	3.14	0.50	2.00	1	3.58
DR5-1050	CIRCULAR	2.00	3.14	0.50	2.00	1	9.94
DR5-1051	CIRCULAR	2.00	3.14	0.50	2.00	1	9.98
DR5-1058	CIRCULAR	2.50	4.91	0.63	2.50	1	19.44
DR5-1067	CIRCULAR	4.50	15.90	1.13	4.50	1	54.46
DR5-1069	CIRCULAR	1.75	2.41	0.44	1.75	1	9.66
DR5-1070	CIRCULAR	2.50	4.91	0.63	2.50	1	20.52
DR5-1088	CIRCULAR	2.00	3.14	0.50	2.00	1	15.59
DR5-1091	CIRCULAR	2.00	3.14	0.50	2.00	1	18.56
DR5-1094	CIRCULAR	2.00	3.14	0.50	2.00	1	13.63
DR5-1098	CIRCULAR	3.00	7.07	0.75	3.00	1	48.74
DR5-1101	CIRCULAR	2.00	3.14	0.50	2.00	1	13.44
DR5-1104	CIRCULAR	3.00	7.07	0.75	3.00	1	27.58
DR5-1111	CIRCULAR	4.00	12.57	1.00	4.00	1	66.52
DR5-1119	CIRCULAR	3.50	9.62	0.88	3.50	1	44.36
DR5-1120	CIRCULAR	3.50	9.62	0.88	3.50	1	39.81
DR5-1121	CIRCULAR	2.00	3.14	0.50	2.00	1	12.63
DR5-1127	CIRCULAR	2.00	3.14	0.50	2.00	1	14.59
DR5-1137	CIRCULAR	2.00	3.14	0.50	2.00	1	21.62

## Briarfield10yrtwExisting-10yr24hr

DR5-1146	CIRCULAR	3.00	7.07	0.75	3.00	1	82.42
DR5-1149	CIRCULAR	5.50	23.76	1.38	5.50	1	102.76
DR5-1155	CIRCULAR	2.00	3.14	0.50	2.00	1	29.56
DR5-1164	CIRCULAR	5.50	23.76	1.38	5.50	1	245.46
DR5-1176	CIRCULAR	2.25	3.98	0.56	2.25	1	23.46
DR5-1181	CIRCULAR	2.00	3.14	0.50	2.00	1	13.10
DR5-1187	CIRCULAR	2.00	3.14	0.50	2.00	1	20.41
DR5-1196	CIRCULAR	4.00	12.57	1.00	4.00	1	99.22
DR5-1197	CIRCULAR	2.67	5.59	0.67	2.67	1	35.16
DR5-1201	CIRCULAR	2.67	5.59	0.67	2.67	1	55.62
DR5-1205	CIRCULAR	2.25	3.98	0.56	2.25	1	23.45
DR5-1208	CIRCULAR	2.00	3.14	0.50	2.00	2	12.08
DR5-1212	CIRCULAR	2.00	3.14	0.50	2.00	1	19.43
DR5-1213	CIRCULAR	2.50	4.91	0.63	2.50	1	32.69
DR5-1217	CIRCULAR	1.83	2.64	0.46	1.83	1	11.28
DR5-1218	CIRCULAR	4.00	12.57	1.00	4.00	1	54.23
DR5-1228	CIRCULAR	3.50	9.62	0.88	3.50	1	44.32
DR5-1233	CIRCULAR	4.00	12.57	1.00	4.00	1	54.49
DR5-1236	CIRCULAR	3.50	9.62	0.88	3.50	1	38.84
DR5-1240	CIRCULAR	3.00	7.07	0.75	3.00	1	21.93
DR5-1244	CIRCULAR	2.50	4.91	0.63	2.50	2	20.55
DR5-1253	CIRCULAR	2.00	3.14	0.50	2.00	1	12.63
DR5-1255	CIRCULAR	2.00	3.14	0.50	2.00	1	6.07
DR5-1304	CIRCULAR	2.00	3.14	0.50	2.00	1	11.02
DR5-1305	CIRCULAR	2.00	3.14	0.50	2.00	1	6.03
DR5-1307	CIRCULAR	2.00	3.14	0.50	2.00	1	73.98
DR5-1314	CIRCULAR	2.00	3.14	0.50	2.00	1	85.45
DR5-1414	CIRCULAR	3.00	7.07	0.75	3.00	1	28.76
DR5-1584	CIRCULAR	2.00	3.14	0.50	2.00	1	36.17
DR5-1591.1	CIRCULAR	2.00	3.14	0.50	2.00	1	42.03
DR5-1600	CIRCULAR	1.67	2.18	0.42	1.67	2	11.88
DR5-1603	CIRCULAR	2.00	3.14	0.50	2.00	1	10.52
DR5-1606	CIRCULAR	2.50	4.91	0.63	2.50	1	36.48
DR5-1609	CIRCULAR	2.00	3.14	0.50	2.00	1	19.31
DR5-1616	CIRCULAR	2.00	3.14	0.50	2.00	1	33.05
DR5-1619	CIRCULAR	2.00	3.14	0.50	2.00	1	18.79
DR5-1634	CIRCULAR	2.00	3.14	0.50	2.00	1	9.70
DR5-1637.1	CIRCULAR	5.00	19.63	1.25	5.00	1	148.00
DR5-1670	CIRCULAR	3.00	7.07	0.75	3.00	1	70.51
DR5-1672.1	CIRCULAR	2.00	3.14	0.50	2.00	1	23.84
DR5-1692	CIRCULAR	4.83	18.35	1.21	4.83	2	109.49
DR5-1694.1	CIRCULAR	2.00	3.14	0.50	2.00	1	19.53
DR5-1703	CIRCULAR	2.00	3.14	0.50	2.00	1	13.44
DR5-1706	CIRCULAR	5.00	19.63	1.25	5.00	1	190.45

## Briarfield10yrtwExisting-10yr24hr

DR5-1710	CIRCULAR	2.00	3.14	0.50	2.00	1	13.10
DR5-1712	CIRCULAR	2.00	3.14	0.50	2.00	1	10.70
DR5-1715	CIRCULAR	4.00	12.57	1.00	4.00	1	75.85
DR5-1724	CIRCULAR	4.00	12.57	1.00	4.00	1	68.27
DR5-1727	CIRCULAR	4.00	12.57	1.00	4.00	1	66.97
DR5-1732.1	CIRCULAR	2.00	3.14	0.50	2.00	1	10.01
DR5-1736	CIRCULAR	2.50	4.91	0.63	2.50	1	32.70
DR5-1742	CIRCULAR	3.50	9.62	0.88	3.50	1	44.34
DR5-1743	CIRCULAR	4.00	12.57	1.00	4.00	1	54.43
DR5-1745	CIRCULAR	2.00	3.14	0.50	2.00	1	25.74
DR5-1747	CIRCULAR	2.00	3.14	0.50	2.00	1	20.73
DR5-1755	CIRCULAR	4.00	12.57	1.00	4.00	1	54.33
DR5-1758	CIRCULAR	2.00	3.14	0.50	2.00	1	34.29
DR5-1759	CIRCULAR	3.50	9.62	0.88	3.50	1	54.89
DR5-1762	CIRCULAR	2.00	3.14	0.50	2.00	1	5.77
DR5-1764	CIRCULAR	5.00	19.63	1.25	5.00	1	71.83
DR5-1772	CIRCULAR	2.00	3.14	0.50	2.00	1	11.54
DR5-1778	CIRCULAR	2.00	3.14	0.50	2.00	1	14.50
DR5-1781.1	CIRCULAR	4.50	15.90	1.13	4.50	1	54.39
DR5-1786	CIRCULAR	2.50	4.91	0.63	2.50	1	13.50
DR5-1787.1	CIRCULAR	2.50	4.91	0.63	2.50	1	13.48
DR5-1791	CIRCULAR	2.00	3.14	0.50	2.00	1	7.44
DR5-1793	CIRCULAR	2.00	3.14	0.50	2.00	1	16.11
DR5-1794	CIRCULAR	2.00	3.14	0.50	2.00	1	16.08
DR5-1795.1	CIRCULAR	3.00	7.07	0.75	3.00	1	36.92
DR5-1796.1	CIRCULAR	2.00	3.14	0.50	2.00	1	12.64
DR5-1835	CIRCULAR	3.50	9.62	0.88	3.50	2	71.35
DR5-1838	CIRCULAR	3.50	9.62	0.88	3.50	2	144.11
DR5-1839	CIRCULAR	2.00	3.14	0.50	2.00	1	42.67
DR5-1840	CIRCULAR	2.00	3.14	0.50	2.00	1	21.99
DR5-1868	CIRCULAR	2.00	3.14	0.50	2.00	1	16.63
DR5-1871	CIRCULAR	3.00	7.07	0.75	3.00	1	36.61
DR5-1872	CIRCULAR	3.00	7.07	0.75	3.00	1	38.05
DR5-1998	CIRCULAR	2.00	3.14	0.50	2.00	1	27.85
DR5-1999	CIRCULAR	2.00	3.14	0.50	2.00	1	18.96
DR5-2129	CIRCULAR	2.25	3.98	0.56	2.25	1	23.45
DR5-2241.1	CIRCULAR	3.50	9.62	0.88	3.50	2	43.99
DR5-2242.1	CIRCULAR	3.50	9.62	0.88	3.50	2	43.98
DR5-2288	CIRCULAR	4.50	15.90	1.13	4.50	1	137.38
DR5-2289	CIRCULAR	2.00	3.14	0.50	2.00	1	29.55
DR5-2303	CIRCULAR	1.50	1.77	0.38	1.50	1	22.64
DR5-2308	CIRCULAR	4.00	12.57	1.00	4.00	1	66.54
DR5-2309	CIRCULAR	4.00	12.57	1.00	4.00	1	52.88
DR5-2313	CIRCULAR	2.00	3.14	0.50	2.00	1	10.03

## Briarfield10yrtwExisting-10yr24hr

DR5-2328	CIRCULAR	2.00	3.14	0.50	2.00	1	13.36
DR5-2331	CIRCULAR	2.00	3.14	0.50	2.00	1	16.59
DR5-2370	CIRCULAR	2.50	4.91	0.63	2.50	1	17.45
DR5-2378	CIRCULAR	3.00	7.07	0.75	3.00	1	49.11
DR5-2404	CIRCULAR	2.50	4.91	0.63	2.50	1	21.02
DR5-2430	CIRCULAR	2.00	3.14	0.50	2.00	1	21.63
DR5-2447	CIRCULAR	3.50	9.62	0.88	3.50	1	44.20
DR5-2512	CIRCULAR	3.50	9.62	0.88	3.50	2	43.91
DR5-2513	CIRCULAR	2.50	4.91	0.63	2.50	1	31.36
DR5-2531	CIRCULAR	2.00	3.14	0.50	2.00	1	27.95
DR5-2534	CIRCULAR	2.50	4.91	0.63	2.50	1	19.41
DR5-2563	CIRCULAR	2.50	4.91	0.63	2.50	1	13.49
DR5-2572	CIRCULAR	2.00	3.14	0.50	2.00	1	18.05
DR5-2691	CIRCULAR	3.50	9.62	0.88	3.50	2	71.49
DR5-2710	CIRCULAR	1.50	1.77	0.38	1.50	1	6.36
DR5-2727	CIRCULAR	2.00	3.14	0.50	2.00	1	13.43
DR5-2736	CIRCULAR	3.50	9.62	0.88	3.50	1	39.80
DR5-2737	CIRCULAR	3.50	9.62	0.88	3.50	1	39.82
DR5-2744	CIRCULAR	2.00	3.14	0.50	2.00	1	34.05
DR5-2746	CIRCULAR	3.50	9.62	0.88	3.50	1	42.08
DR5-2747	CIRCULAR	1.50	1.77	0.38	1.50	1	8.03
DR5-2792	CIRCULAR	4.00	12.57	1.00	4.00	1	54.37
DR5-2801	CIRCULAR	3.00	7.07	0.75	3.00	1	31.50
DR5-2804	CIRCULAR	2.00	3.14	0.50	2.00	1	12.53
DR5-2834	CIRCULAR	3.50	9.62	0.88	3.50	1	44.24
DR5-2837.1	CIRCULAR	2.00	3.14	0.50	2.00	1	13.35
DR5-2839	CIRCULAR	3.50	9.62	0.88	3.50	1	49.98
DR5-2871	CIRCULAR	2.50	4.91	0.63	2.50	1	25.79
DR5-2880	CIRCULAR	5.00	19.63	1.25	5.00	2	45.46
DR5-2884.1	CIRCULAR	2.00	3.14	0.50	2.00	1	11.32
DR5-2885	CIRCULAR	2.00	3.14	0.50	2.00	1	11.32
DR5-2886.1	CIRCULAR	2.00	3.14	0.50	2.00	1	11.32
DR5-2961	CIRCULAR	2.00	3.14	0.50	2.00	1	14.49
DR5-2962	CIRCULAR	2.00	3.14	0.50	2.00	1	12.96
DR5-2968	CIRCULAR	4.00	12.57	1.00	4.00	1	126.17
DR5-2976	CIRCULAR	2.00	3.14	0.50	2.00	1	25.93
DR5-3011	CIRCULAR	2.00	3.14	0.50	2.00	1	12.07
DR5-3017	CIRCULAR	5.50	23.76	1.38	5.50	1	102.55
DR5-3129	CIRCULAR	5.50	23.76	1.38	5.50	1	213.47
DR5-3144	CIRCULAR	2.00	3.14	0.50	2.00	1	27.97
DR5-3162	CIRCULAR	3.50	9.62	0.88	3.50	1	34.98
DR5-3172	CIRCULAR	2.00	3.14	0.50	2.00	1	15.59
DR5-3175	CIRCULAR	3.50	9.62	0.88	3.50	1	39.82
DR5-3179	CIRCULAR	2.00	3.14	0.50	2.00	1	53.37

## Briarfield10yrtwExisting-10yr24hr

DR5-3255	CIRCULAR	2.00	3.14	0.50	2.00	1	14.69
DR5-3256	CIRCULAR	2.00	3.14	0.50	2.00	1	11.03
DR5-3339	CIRCULAR	1.25	1.23	0.31	1.25	1	14.66
DR5-3373	CIRCULAR	2.00	3.14	0.50	2.00	1	4.77
DR5-3405	CIRCULAR	2.50	4.91	0.63	2.50	1	40.02
DR5-3448	CIRCULAR	2.50	4.91	0.63	2.50	1	90.72
DR5-3450	CIRCULAR	2.00	3.14	0.50	2.00	1	11.48
DR5-3451	CIRCULAR	2.50	4.91	0.63	2.50	1	50.69
DR5-3456	CIRCULAR	2.50	4.91	0.63	2.50	1	25.80
DR5-3508	CIRCULAR	2.50	4.91	0.63	2.50	1	27.54
DR5-3703	CIRCULAR	2.00	3.14	0.50	2.00	1	19.97
DR5-3733	CIRCULAR	4.50	15.90	1.13	4.50	1	87.25
DR5-3754	CIRCULAR	2.50	4.91	0.63	2.50	3	36.03
DR5-3757.1	CIRCULAR	3.50	9.62	0.88	3.50	1	45.01
DR5-3759	CIRCULAR	3.50	9.62	0.88	3.50	1	95.03
DR5-3775	CIRCULAR	2.00	3.14	0.50	2.00	1	15.44
DR5-3777	CIRCULAR	2.00	3.14	0.50	2.00	1	3.83
DR5-3792.1	CIRCULAR	2.00	3.14	0.50	2.00	1	24.39
DR5-3793	CIRCULAR	2.00	3.14	0.50	2.00	1	24.15
DR5-3795	CIRCULAR	2.00	3.14	0.50	2.00	1	4.68
DR5-3820	CIRCULAR	2.00	3.14	0.50	2.00	1	18.98
DR5-3824	CIRCULAR	2.00	3.14	0.50	2.00	1	15.59
DR5-3834.1	CIRCULAR	2.50	4.91	0.63	2.50	1	23.48
DR5-3839	CIRCULAR	3.00	7.07	0.75	3.00	1	72.49
DR5-3842.1	CIRCULAR	3.00	7.07	0.75	3.00	1	61.51
DR5-3847	CIRCULAR	2.67	5.59	0.67	2.67	1	55.60
DR5-3851	CIRCULAR	2.00	3.14	0.50	2.00	2	55.30
DR5-3854	CIRCULAR	5.00	19.63	1.25	5.00	1	215.19
DR5-3866.1	CIRCULAR	2.00	3.14	0.50	2.00	1	12.87
DR5-3867	CIRCULAR	2.67	5.59	0.67	2.67	2	34.32
DR5-3869	CIRCULAR	4.00	12.57	1.00	4.00	1	54.37
DR5-3883	CIRCULAR	2.50	4.91	0.63	2.50	1	27.39
DR5-3886.1	CIRCULAR	2.00	3.14	0.50	2.00	1	23.50
DR5-3897	CIRCULAR	2.50	4.91	0.63	2.50	1	23.48
DR5-3901	CIRCULAR	4.50	15.90	1.13	4.50	1	54.37
DR5-3908	CIRCULAR	3.00	7.07	0.75	3.00	1	21.95
DR5-3913	CIRCULAR	2.00	3.14	0.50	2.00	1	9.58
DR5-3914.1	CIRCULAR	4.00	12.57	1.00	4.00	1	71.19
DR5-3915	CIRCULAR	2.00	3.14	0.50	2.00	1	42.23
DR5-3949	CIRCULAR	2.25	3.98	0.56	2.25	1	19.09
DR5-3963	CIRCULAR	2.00	3.14	0.50	2.00	1	37.51
DR5-4094	CIRCULAR	4.00	12.57	1.00	4.00	1	71.14
DR5-4201	CIRCULAR	3.00	7.07	0.75	3.00	1	21.90
DR5-4202	CIRCULAR	2.00	3.14	0.50	2.00	1	19.69

## Briarfield10yrtwExisting-10yr24hr

DR5-4205	CIRCULAR	5.50	23.76	1.38	5.50	1	102.44
DR5-4223	CIRCULAR	2.00	3.14	0.50	2.00	1	15.60
DR5-4224.1	CIRCULAR	2.00	3.14	0.50	2.00	1	18.99
DR5-4227	CIRCULAR	2.00	3.14	0.50	2.00	1	15.60
DR5-4229	CIRCULAR	2.00	3.14	0.50	2.00	2	22.61
DR5-4232	CIRCULAR	2.00	3.14	0.50	2.00	1	13.09
DR5-4271	CIRCULAR	4.00	12.57	1.00	4.00	1	52.93
DR5-4274	CIRCULAR	3.50	9.62	0.88	3.50	2	34.17
DR5-4300	CIRCULAR	4.00	12.57	1.00	4.00	1	54.44
DR5-4310.1	CIRCULAR	2.00	3.14	0.50	2.00	1	11.19
DR5-4314.1	CIRCULAR	3.00	7.07	0.75	3.00	1	72.50
DR5-4323.1	TRAPEZOIDAL	5.20	98.72	2.94	31.44	1	506.29
DR5-4337	CIRCULAR	2.00	3.14	0.50	2.00	1	19.98
DR5-4342	CIRCULAR	2.00	3.14	0.50	2.00	1	15.70
DR5-4356.1	CIRCULAR	2.00	3.14	0.50	2.00	1	13.46
DR5-4399	CIRCULAR	2.50	4.91	0.63	2.50	1	25.78
DR5-4431	CIRCULAR	4.00	12.57	1.00	4.00	1	27.89
DR5-4437	CIRCULAR	3.00	7.07	0.75	3.00	1	82.13
DR5-4470	CIRCULAR	2.50	4.91	0.63	2.50	1	20.93
DR5-4472	CIRCULAR	3.50	9.62	0.88	3.50	1	39.75
DR5-4473	CIRCULAR	2.50	4.91	0.63	2.50	2	20.51
DR5-4474	CIRCULAR	2.50	4.91	0.63	2.50	1	23.49
DR5-4477	CIRCULAR	4.50	15.90	1.13	4.50	1	54.45
DR5-4511	CIRCULAR	4.00	12.57	1.00	4.00	1	71.21
DR5-4513	CIRCULAR	2.00	3.14	0.50	2.00	1	11.31
DR5-4522	CIRCULAR	1.25	1.23	0.31	1.25	1	2.70
DR5-4536	CIRCULAR	4.00	12.57	1.00	4.00	1	104.29
DR5-4557	CIRCULAR	3.50	9.62	0.88	3.50	1	47.62
DR5-4561	CIRCULAR	3.50	9.62	0.88	3.50	1	32.74
DR5-4661	CIRCULAR	2.00	3.14	0.50	2.00	1	14.68
DR5-4674	CIRCULAR	2.00	3.14	0.50	2.00	1	13.43
DR5-4681	CIRCULAR	2.00	3.14	0.50	2.00	1	18.60
DR5-5148	CIRCULAR	1.25	1.23	0.31	1.25	1	4.10
DR5-5149	CIRCULAR	1.25	1.23	0.31	1.25	1	5.02
DR5-5150	CIRCULAR	1.25	1.23	0.31	1.25	1	6.33
DR5-5153	CIRCULAR	1.50	1.77	0.38	1.50	1	37.34
DR5-5154	CIRCULAR	1.25	1.23	0.31	1.25	1	17.62
DR5-5181	CIRCULAR	2.00	3.14	0.50	2.00	1	1.83
DR5-5207	CIRCULAR	2.50	4.91	0.63	2.50	1	63.68
DR5-5210	CIRCULAR	2.50	4.91	0.63	2.50	1	30.98
DR5-5211	CIRCULAR	2.50	4.91	0.63	2.50	1	11.88
DR5-5213	CIRCULAR	2.50	4.91	0.63	2.50	1	13.96
DR5-5214	CIRCULAR	2.00	3.14	0.50	2.00	1	18.48
DR5-5224	CIRCULAR	4.50	15.90	1.13	4.50	1	188.04

Briarfield10yrtwExisting-10yr24hr

Link3595	CIRCULAR	3.00	7.07	0.75	3.00	1	40.58
Link3597	TRAPEZOIDAL	2.00	36.00	1.36	26.00	1	288.37
MN01.1	TRAPEZOIDAL	4.00	104.00	2.22	46.00	1	290.05
MN02.1	TRAPEZOIDAL	2.00	16.00	1.09	14.00	1	94.22
MN03.1	TRAPEZOIDAL	1.50	27.00	1.11	24.00	1	139.22
MN04.1	TRAPEZOIDAL	6.00	128.40	3.25	37.30	1	588.83
MN05.1	TRAPEZOIDAL	8.33	291.47	4.65	59.98	1	866.80
MN06.1	TRAPEZOIDAL	3.70	142.12	2.04	69.12	1	1032.84
MN07.1	TRAPEZOIDAL	3.70	142.12	2.04	69.12	1	767.06
MN08.1	TRAPEZOIDAL	6.00	135.48	3.48	36.38	1	334.24
MN09.1	CIRCULAR	5.00	19.63	1.25	5.00	1	49.65
MN10.1	TRAPEZOIDAL	2.60	94.38	1.85	50.60	1	639.40
MN11.1	TRAPEZOIDAL	1.00	34.00	0.72	47.00	1	168.08
MN12.1	CIRCULAR	4.50	15.90	1.13	4.50	1	91.01
MN13.1	CIRCULAR	4.50	15.90	1.13	4.50	1	167.21
MN14.1	CIRCULAR	4.50	15.90	1.13	4.50	1	76.79
MN15	TRAPEZOIDAL	2.50	25.00	1.37	17.50	1	61.62
MN16	TRAPEZOIDAL	2.50	25.00	1.37	17.50	1	109.75
MN17	TRAPEZOIDAL	6.00	220.80	3.38	64.10	1	5291.31
MN18	TRAPEZOIDAL	4.00	128.00	2.42	52.00	1	462.17
MN19	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	229.08
MN20	TRAPEZOIDAL	5.00	193.00	2.78	68.60	1	763.41
MN22	TRAPEZOIDAL	4.00	150.80	2.28	65.70	1	647.21
MN23	TRAPEZOIDAL	5.00	158.50	2.79	55.70	1	225.93
MN24	TRAPEZOIDAL	6.00	183.72	3.39	52.64	1	349.08
MN26	TRAPEZOIDAL	7.00	165.20	4.04	37.60	1	599.64
MN27	TRAPEZOIDAL	5.00	190.00	2.88	65.00	1	471.59
MN31	TRAPEZOIDAL	4.00	70.24	2.21	30.56	1	350.11
MN33	TRAPEZOIDAL	3.00	57.27	1.78	31.48	1	90.88
MN35	TRAPEZOIDAL	3.00	49.50	1.81	26.50	1	592.46
MN37	TRAPEZOIDAL	4.00	106.00	2.20	47.50	1	246.58
MN38	TRAPEZOIDAL	4.00	66.24	2.22	28.56	1	155.23
MN41	TRAPEZOIDAL	4.40	79.83	2.47	30.84	1	362.27
MN42	TRAPEZOIDAL	4.40	142.91	2.50	56.46	1	897.55
MN43	TRAPEZOIDAL	6.60	227.36	3.72	59.40	1	755.80
MN44	CIRCULAR	2.00	3.14	0.50	2.00	1	14.50
MN45	CIRCULAR	3.00	7.07	0.75	3.00	1	50.15

\*\*\*\*\* Volume Depth

Runoff Quantity Continuity acre-feet inches

\*\*\*\*\* ----- -----

Total Precipitation ..... 442.094 5.540

Briarfield10yrtwExisting-10yr24hr

Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	210.334	2.636
Surface Runoff .....	230.534	2.889
Final Surface Storage ....	1.263	0.016
Continuity Error (%) .....	-0.009	

	Volume acre-feet	Volume $10^6$ gal
Flow Routing Continuity	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	230.534	75.123
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	205.189	66.864
Internal Outflow .....	0.000	0.000
Evaporation Loss .....	0.000	0.000
Seepage Loss .....	0.000	0.000
Initial Stored Volume ....	2.449	0.798
Final Stored Volume .....	28.602	9.320
Continuity Error (%) .....	-0.347	

\*\*\*\*\*

Highest Continuity Errors

\*\*\*\*\*

Node DR5-1943 (-48.46%)  
Node DR5-2879 (22.78%)  
Node DR5-0603 (9.87%)  
Node DR5-4345 (8.36%)  
Node DR5-0498 (3.68%)

\*\*\*\*\*

Time-Step Critical Elements

\*\*\*\*\*

Link MN13.1 (24.74%)

\*\*\*\*\*

Highest Flow Instability Indexes

\*\*\*\*\*

Link DR5-1778 (92)

# Briarfield10yrtwExisting-10yr24hr

Link TownPark (80)  
Link MN02.1 (74)  
Link MN07.1 (68)  
Link DR5-3824 (60)

\*\*\*\*\*

## Routing Time Step Summary

\*\*\*\*\*

Minimum Time Step : 0.50 sec  
Average Time Step : 0.89 sec  
Maximum Time Step : 1.00 sec  
Percent in Steady State : 0.00  
Average Iterations per Step : 4.26  
Percent Not Converging : 20.25

\*\*\*\*\*

## Subcatchment Runoff Summary

\*\*\*\*\*

Subcatchment	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff 10^6 gal	Total Runoff CFS	Peak Runoff CFS
	in	in	in	in	in	10^6 gal	CFS	
DR5-0474#1	5.54	0.00	0.00	2.98	2.55	0.09	4.98	0.461
DR5-0498#1	5.54	0.00	0.00	3.45	2.08	1.32	49.00	0.375
DR5-0504#1	5.54	0.00	0.00	3.53	2.00	0.30	14.15	0.361
DR5-0524#1	5.54	0.00	0.00	3.10	2.42	0.45	20.08	0.437
DR5-0572#1	5.54	0.00	0.00	0.59	4.93	0.04	2.27	0.889
DR5-0584#1	5.54	0.00	0.00	4.02	1.52	0.02	1.89	0.274
DR5-0593#1	5.54	0.00	0.00	3.55	1.98	0.03	2.49	0.358
DR5-0599#1	5.54	0.00	0.00	1.31	4.21	0.12	6.05	0.760
DR5-0648#1	5.54	0.00	0.00	1.30	4.22	0.12	6.46	0.761
DR5-0661#1	5.54	0.00	0.00	3.67	1.86	1.18	52.76	0.335
DR5-0681#1	5.54	0.00	0.00	1.71	3.81	0.10	5.28	0.687
DR5-0689#1	5.54	0.00	0.00	4.90	0.64	0.02	1.10	0.115
DR5-0690#1	5.54	0.00	0.00	3.43	2.10	0.08	4.04	0.379
DR5-0691#1	5.54	0.00	0.00	3.25	2.28	0.21	10.21	0.411
DR5-0712#1	5.54	0.00	0.00	3.12	2.41	0.19	8.78	0.435
DR5-0714#1	5.54	0.00	0.00	0.82	4.70	0.16	8.16	0.849
DR5-0715#1	5.54	0.00	0.00	5.37	0.17	0.01	0.74	0.030
DR5-0716#1	5.54	0.00	0.00	5.42	0.11	0.00	0.18	0.021

## Briarfield10yrtwExisting-10yr24hr

DR5-0718#1	5.54	0.00	0.00	2.96	2.57	0.79	33.74	0.464
DR5-0724#1	5.54	0.00	0.00	2.99	2.53	0.20	9.42	0.457
DR5-0730#1	5.54	0.00	0.00	3.20	2.33	5.97	175.05	0.420
DR5-0737#1	5.54	0.00	0.00	3.45	2.08	0.03	1.85	0.375
DR5-0738#1	5.54	0.00	0.00	3.66	1.87	0.04	2.15	0.338
DR5-0739#1	5.54	0.00	0.00	2.65	2.88	0.14	6.85	0.520
DR5-0744#1	5.54	0.00	0.00	3.26	2.27	0.29	14.93	0.410
DR5-0751#1	5.54	0.00	0.00	3.53	2.01	0.03	1.92	0.362
DR5-0754#1	5.54	0.00	0.00	0.05	5.47	0.22	10.60	0.987
DR5-0769#1	5.54	0.00	0.00	3.12	2.41	0.04	2.28	0.435
DR5-0772#1	5.54	0.00	0.00	3.37	2.16	0.02	1.76	0.390
DR5-0781#1	5.54	0.00	0.00	3.82	1.71	0.08	4.40	0.309
DR5-0782#1	5.54	0.00	0.00	4.20	1.33	0.01	0.71	0.241
DR5-0783#1	5.54	0.00	0.00	3.29	2.24	0.87	35.82	0.404
DR5-0790#1	5.54	0.00	0.00	3.90	1.63	0.02	1.07	0.295
DR5-0792#1	5.54	0.00	0.00	4.00	1.54	0.02	1.28	0.277
DR5-0800#1	5.54	0.00	0.00	1.42	4.10	0.56	28.82	0.739
DR5-0806#1	5.54	0.00	0.00	5.00	0.54	0.03	3.04	0.097
DR5-0808#1	5.54	0.00	0.00	1.07	4.45	0.32	16.26	0.803
DR5-0809#1	5.54	0.00	0.00	3.37	2.16	0.24	12.61	0.390
DR5-0810#1	5.54	0.00	0.00	3.63	1.90	0.65	27.28	0.343
DR5-0814#1	5.54	0.00	0.00	3.88	1.65	0.18	9.20	0.297
DR5-0818#1	5.54	0.00	0.00	2.79	2.74	0.17	8.91	0.494
DR5-0833#1	5.54	0.00	0.00	0.83	4.69	0.03	1.75	0.846
DR5-0841#1	5.54	0.00	0.00	3.85	1.68	0.18	8.68	0.304
DR5-0852#1	5.54	0.00	0.00	4.32	1.22	0.05	3.19	0.219
DR5-0858#1	5.54	0.00	0.00	4.96	0.58	0.05	3.65	0.105
DR5-0868#1	5.54	0.00	0.00	3.19	2.34	0.35	17.40	0.422
DR5-0873#1	5.54	0.00	0.00	0.98	4.54	0.03	1.48	0.820
DR5-0874#1	5.54	0.00	0.00	2.52	3.01	0.16	9.81	0.543
DR5-0876#1	5.54	0.00	0.00	4.19	1.34	0.35	16.64	0.242
DR5-0888#1	5.54	0.00	0.00	0.65	4.86	0.11	5.85	0.878
DR5-0889#1	5.54	0.00	0.00	4.38	1.16	0.26	13.09	0.209
DR5-0896#1	5.54	0.00	0.00	2.55	2.98	0.16	8.54	0.537
DR5-0898#1	5.54	0.00	0.00	0.93	4.58	0.94	34.19	0.828
DR5-0907#1	5.54	0.00	0.00	1.27	4.24	0.14	7.15	0.766
DR5-0914#1	5.54	0.00	0.00	1.94	3.58	0.59	22.32	0.647
DR5-0925#1	5.54	0.00	0.00	0.54	4.97	0.36	14.87	0.898
DR5-0932#1	5.54	0.00	0.00	3.76	1.78	0.05	3.30	0.321
DR5-0942#1	5.54	0.00	0.00	2.35	3.18	0.44	21.18	0.573
DR5-0947#1	5.54	0.00	0.00	4.94	0.60	0.04	3.36	0.108
DR5-0951#1	5.54	0.00	0.00	1.38	4.14	0.21	10.50	0.746
DR5-0958#1	5.54	0.00	0.00	1.89	3.63	0.15	8.03	0.656
DR5-0966#1	5.54	0.00	0.00	1.09	4.43	0.11	5.33	0.799

## Briarfield10yrtwExisting-10yr24hr

DR5-0973#1	5.54	0.00	0.00	1.56	3.96	0.14	6.97	0.715
DR5-0983#1	5.54	0.00	0.00	2.37	3.16	0.07	4.04	0.570
DR5-0988#1	5.54	0.00	0.00	1.87	3.66	0.09	3.89	0.660
DR5-0991#1	5.54	0.00	0.00	1.57	3.95	0.04	2.26	0.713
DR5-0992#1	5.54	0.00	0.00	1.31	4.21	0.18	8.27	0.760
DR5-0999#1	5.54	0.00	0.00	1.85	3.67	3.19	107.27	0.662
DR5-1004#1	5.54	0.00	0.00	0.53	4.99	0.14	6.83	0.900
DR5-1005#1	5.54	0.00	0.00	4.42	1.11	0.02	1.22	0.201
DR5-1012#1	5.54	0.00	0.00	1.25	4.26	0.24	11.36	0.770
DR5-1032#1	5.54	0.00	0.00	2.26	3.26	0.07	4.12	0.589
DR5-1033#1	5.54	0.00	0.00	0.42	5.10	0.10	5.01	0.920
DR5-1034#1	5.54	0.00	0.00	1.92	3.60	0.04	2.05	0.650
DR5-1035#1	5.54	0.00	0.00	0.87	4.64	2.17	79.15	0.838
DR5-1311#1	5.54	0.00	0.00	0.71	4.81	0.10	5.32	0.867
DR5-1334#1	5.54	0.00	0.00	2.01	3.52	0.03	1.70	0.635
DR5-1350#1	5.54	0.00	0.00	1.22	4.30	0.04	2.25	0.776
DR5-1361#1	5.54	0.00	0.00	2.81	2.71	0.09	5.04	0.490
DR5-1363#1	5.54	0.00	0.00	2.39	3.13	0.05	3.06	0.566
DR5-1371#1	5.54	0.00	0.00	3.10	2.43	0.17	8.06	0.438
DR5-1372#1	5.54	0.00	0.00	0.64	4.88	0.02	1.35	0.880
DR5-1378#1	5.54	0.00	0.00	0.00	5.51	0.16	5.80	0.994
DR5-1379#1	5.54	0.00	0.00	1.57	3.95	0.03	1.94	0.713
DR5-1391#1	5.54	0.00	0.00	2.96	2.57	0.25	11.59	0.463
DR5-1395#1	5.54	0.00	0.00	3.32	2.21	0.12	6.02	0.399
DR5-1396#1	5.54	0.00	0.00	0.00	5.51	0.16	6.17	0.994
DR5-1404#1	5.54	0.00	0.00	3.15	2.38	0.27	13.11	0.429
DR5-1405#1	5.54	0.00	0.00	3.03	2.50	0.17	6.53	0.451
DR5-1408#1	5.54	0.00	0.00	2.04	3.48	0.14	5.82	0.629
DR5-1409#1	5.54	0.00	0.00	1.33	4.19	0.07	4.16	0.756
DR5-1429#1	5.54	0.00	0.00	3.63	1.90	0.19	9.51	0.343
DR5-1464#1	5.54	0.00	0.00	1.27	4.25	0.12	6.21	0.767
DR5-1493#1	5.54	0.00	0.00	3.23	2.30	0.36	18.53	0.415
DR5-1518#1	5.54	0.00	0.00	2.42	3.10	0.06	3.41	0.560
DR5-1522#1	5.54	0.00	0.00	2.52	3.01	0.05	2.91	0.543
DR5-1530#1	5.54	0.00	0.00	3.65	1.88	0.14	7.23	0.340
DR5-1531#1	5.54	0.00	0.00	2.58	2.94	0.11	6.05	0.531
DR5-1533#1	5.54	0.00	0.00	2.96	2.57	0.02	0.91	0.464
DR5-1554#1	5.54	0.00	0.00	2.75	2.78	0.17	6.64	0.502
DR5-1555#1	5.54	0.00	0.00	4.40	1.13	0.07	3.78	0.204
DR5-1557#1	5.54	0.00	0.00	3.20	2.32	0.17	6.47	0.419
DR5-1591#1	5.54	0.00	0.00	3.31	2.22	0.52	21.25	0.401
DR5-1596#1	5.54	0.00	0.00	2.33	3.19	0.16	7.73	0.576
DR5-1597#1	5.54	0.00	0.00	3.02	2.51	0.36	18.17	0.453
DR5-1607#1	5.54	0.00	0.00	2.35	3.17	0.67	30.47	0.573

## Briarfield10yrtwExisting-10yr24hr

DR5-1614#1	5.54	0.00	0.00	3.08	2.44	0.21	10.50	0.441
DR5-1615#1	5.54	0.00	0.00	3.24	2.29	0.39	15.90	0.414
DR5-1623#1	5.54	0.00	0.00	2.52	3.00	0.05	2.86	0.542
DR5-1626#1	5.54	0.00	0.00	1.97	3.55	0.07	3.54	0.641
DR5-1629#1	5.54	0.00	0.00	0.60	4.91	0.10	5.33	0.887
DR5-1632#1	5.54	0.00	0.00	0.67	4.84	0.04	2.18	0.874
DR5-1633#1	5.54	0.00	0.00	2.85	2.68	0.08	3.98	0.483
DR5-1636#1	5.54	0.00	0.00	3.66	1.87	0.57	25.86	0.338
DR5-1637#1	5.54	0.00	0.00	3.88	1.65	0.48	22.06	0.298
DR5-1640#1	5.54	0.00	0.00	0.78	4.74	0.32	15.21	0.855
DR5-1646#1	5.54	0.00	0.00	0.37	5.14	0.30	14.94	0.928
DR5-1647#1	5.54	0.00	0.00	3.62	1.92	0.06	3.19	0.346
DR5-1657#1	5.54	0.00	0.00	2.29	3.23	0.04	2.15	0.583
DR5-1659#1	5.54	0.00	0.00	2.23	3.29	0.05	2.77	0.595
DR5-1672#1	5.54	0.00	0.00	2.43	3.10	0.27	12.92	0.559
DR5-1689#1	5.54	0.00	0.00	3.90	1.64	0.70	33.75	0.295
DR5-1694#1	5.54	0.00	0.00	1.80	3.72	0.17	7.65	0.672
DR5-1698#1	5.54	0.00	0.00	1.13	4.39	0.20	9.78	0.792
DR5-1701#1	5.54	0.00	0.00	1.10	4.42	0.01	0.67	0.798
DR5-1704#1	5.54	0.00	0.00	2.13	3.40	0.16	7.97	0.613
DR5-1705#1	5.54	0.00	0.00	1.21	4.31	0.21	9.68	0.778
DR5-1707#1	5.54	0.00	0.00	1.71	3.81	0.13	6.43	0.688
DR5-1732#1	5.54	0.00	0.00	1.42	4.10	0.24	11.61	0.739
DR5-1738#1	5.54	0.00	0.00	1.28	4.24	0.14	7.37	0.766
DR5-1754#1	5.54	0.00	0.00	1.19	4.33	0.12	5.88	0.782
DR5-1757#1	5.54	0.00	0.00	0.92	4.60	0.11	5.51	0.830
DR5-1760#1	5.54	0.00	0.00	1.19	4.32	1.81	68.03	0.781
DR5-1779#1	5.54	0.00	0.00	0.38	5.14	0.21	9.99	0.927
DR5-1780#1	5.54	0.00	0.00	2.04	3.48	0.59	25.19	0.628
DR5-1781#1	5.54	0.00	0.00	0.23	5.28	0.14	7.07	0.953
DR5-1787#1	5.54	0.00	0.00	0.47	5.05	0.13	6.46	0.911
DR5-1792#1	5.54	0.00	0.00	2.23	3.29	0.08	4.75	0.594
DR5-1795#1	5.54	0.00	0.00	0.38	5.14	0.13	6.48	0.928
DR5-1796#1	5.54	0.00	0.00	1.53	3.99	0.20	10.33	0.721
DR5-1797#1	5.54	0.00	0.00	0.62	4.89	0.13	6.54	0.883
DR5-1799#1	5.54	0.00	0.00	0.48	5.03	0.29	12.46	0.908
DR5-1802#1	5.54	0.00	0.00	0.78	4.74	0.25	12.08	0.855
DR5-1803#1	5.54	0.00	0.00	1.64	3.88	0.10	5.08	0.701
DR5-1804#1	5.54	0.00	0.00	0.35	5.16	0.28	9.93	0.932
DR5-1805#1	5.54	0.00	0.00	1.26	4.26	0.09	4.50	0.768
DR5-1809#1	5.54	0.00	0.00	0.05	5.47	0.13	6.33	0.987
DR5-1810#1	5.54	0.00	0.00	0.46	5.05	0.11	5.69	0.912
DR5-1811#1	5.54	0.00	0.00	3.61	1.92	0.03	1.43	0.347
DR5-1812#1	5.54	0.00	0.00	1.86	3.66	1.13	43.34	0.661

## Briarfield10yrtwExisting-10yr24hr

DR5-1819#1	5.54	0.00	0.00	1.91	3.61	0.17	7.75	0.652
DR5-1940#1	5.54	0.00	0.00	0.96	4.56	0.04	2.27	0.823
DR5-1955#1	5.54	0.00	0.00	1.30	4.21	0.28	13.29	0.761
DR5-2033#1	5.54	0.00	0.00	3.14	2.39	0.27	14.31	0.432
DR5-2087#1	5.54	0.00	0.00	0.23	5.28	0.31	14.84	0.953
DR5-2091#1	5.54	0.00	0.00	2.06	3.46	0.03	1.54	0.625
DR5-2092#1	5.54	0.00	0.00	0.42	5.10	0.09	4.73	0.920
DR5-2096#1	5.54	0.00	0.00	0.37	5.14	0.03	1.49	0.928
DR5-2097#1	5.54	0.00	0.00	0.50	5.01	0.01	0.73	0.905
DR5-2192#1	5.54	0.00	0.00	0.62	4.90	0.02	1.41	0.884
DR5-2221#1	5.54	0.00	0.00	0.05	5.46	0.12	5.92	0.986
DR5-2239#1	5.54	0.00	0.00	4.60	0.94	0.03	2.49	0.169
DR5-2240#1	5.54	0.00	0.00	1.12	4.40	0.12	6.28	0.795
DR5-2241#1	5.54	0.00	0.00	1.48	4.04	0.12	6.10	0.729
DR5-2242#1	5.54	0.00	0.00	2.48	3.05	0.27	13.48	0.551
DR5-2259#1	5.54	0.00	0.00	2.49	3.04	0.14	6.66	0.548
DR5-2260#1	5.54	0.00	0.00	1.93	3.59	0.03	1.54	0.648
DR5-2261#1	5.54	0.00	0.00	2.08	3.44	0.06	3.81	0.622
DR5-2262#1	5.54	0.00	0.00	2.28	3.25	0.02	1.28	0.587
DR5-2263#1	5.54	0.00	0.00	3.53	2.00	0.02	1.95	0.362
DR5-2264#1	5.54	0.00	0.00	4.54	1.00	0.01	1.41	0.181
DR5-2846#1	5.54	0.00	0.00	2.44	3.09	0.04	2.36	0.557
DR5-2848#1	5.54	0.00	0.00	1.90	3.62	0.33	17.07	0.653
DR5-2852#1	5.54	0.00	0.00	1.45	4.07	0.42	20.56	0.735
DR5-2864#1	5.54	0.00	0.00	3.42	2.11	0.03	2.24	0.381
DR5-2884#1	5.54	0.00	0.00	0.76	4.76	0.09	4.82	0.859
DR5-2886#1	5.54	0.00	0.00	2.71	2.82	0.08	4.88	0.509
DR5-2887#1	5.54	0.00	0.00	1.79	3.73	0.75	34.48	0.673
DR5-2890#1	5.54	0.00	0.00	0.66	4.86	0.11	5.99	0.877
DR5-2900#1	5.54	0.00	0.00	2.27	3.26	0.07	4.43	0.588
DR5-2905#1	5.54	0.00	0.00	0.37	5.15	0.10	5.18	0.929
DR5-2914#1	5.54	0.00	0.00	1.76	3.76	0.36	18.00	0.678
DR5-2917#1	5.54	0.00	0.00	2.16	3.36	0.19	9.75	0.607
DR5-3028#1	5.54	0.00	0.00	4.10	1.43	0.01	1.01	0.259
DR5-3029#1	5.54	0.00	0.00	1.22	4.30	0.27	11.67	0.776
DR5-3042#1	5.54	0.00	0.00	2.70	2.82	0.13	6.77	0.510
DR5-3044#1	5.54	0.00	0.00	0.00	5.51	0.93	43.42	0.995
DR5-3045#1	5.54	0.00	0.00	0.86	4.66	0.10	5.11	0.841
DR5-3052#1	5.54	0.00	0.00	0.05	5.47	0.15	6.32	0.987
DR5-3056#1	5.54	0.00	0.00	0.37	5.14	0.94	47.66	0.928
DR5-3058#1	5.54	0.00	0.00	0.52	4.99	0.17	8.44	0.902
DR5-3061#1	5.54	0.00	0.00	0.14	5.37	0.28	12.58	0.970
DR5-3068#1	5.54	0.00	0.00	1.69	3.83	0.23	11.35	0.692
DR5-3069#1	5.54	0.00	0.00	0.61	4.91	0.27	14.33	0.886

## Briarfield10yrtwExisting-10yr24hr

DR5-3072#1	5.54	0.00	0.00	0.00	5.51	0.23	10.54	0.995
DR5-3077#1	5.54	0.00	0.00	1.00	4.52	0.17	9.36	0.815
DR5-3080#1	5.54	0.00	0.00	1.17	4.35	0.21	10.76	0.786
DR5-3085#1	5.54	0.00	0.00	3.84	1.69	0.03	1.55	0.306
DR5-3109#1	5.54	0.00	0.00	1.73	3.80	0.19	10.52	0.685
DR5-3123#1	5.54	0.00	0.00	1.58	3.94	0.07	3.78	0.711
DR5-3124#1	5.54	0.00	0.00	1.42	4.10	0.01	0.75	0.741
DR5-3125#1	5.54	0.00	0.00	3.69	1.84	0.03	2.13	0.333
DR5-3127#1	5.54	0.00	0.00	2.89	2.63	0.11	6.00	0.476
DR5-3176#1	5.54	0.00	0.00	0.52	4.99	0.20	9.85	0.901
DR5-3217#1	5.54	0.00	0.00	4.38	1.15	0.07	3.92	0.208
DR5-3218#1	5.54	0.00	0.00	0.84	4.68	0.46	21.15	0.845
DR5-3219#1	5.54	0.00	0.00	0.68	4.84	0.21	9.99	0.873
DR5-3229#1	5.54	0.00	0.00	3.00	2.52	1.14	42.07	0.455
DR5-3651#1	5.54	0.00	0.00	2.14	3.38	0.03	1.75	0.610
DR5-3654#1	5.54	0.00	0.00	2.23	3.30	0.13	7.21	0.595
DR5-3666#1	5.54	0.00	0.00	2.78	2.75	0.33	13.90	0.496
DR5-3672#1	5.54	0.00	0.00	3.98	1.55	0.25	10.92	0.280
DR5-3697#1	5.54	0.00	0.00	3.16	2.37	0.03	1.97	0.429
DR5-3723#1	5.54	0.00	0.00	0.36	5.15	0.15	6.23	0.930
DR5-3724#1	5.54	0.00	0.00	0.76	4.76	0.16	8.98	0.859
DR5-3726#1	5.54	0.00	0.00	3.39	2.14	1.14	50.11	0.387
DR5-3740#1	5.54	0.00	0.00	3.07	2.46	0.09	5.31	0.444
DR5-3746#1	5.54	0.00	0.00	1.22	4.30	0.06	3.08	0.777
DR5-3750#1	5.54	0.00	0.00	2.31	3.21	0.23	11.03	0.579
DR5-3757#1	5.54	0.00	0.00	3.25	2.28	0.04	2.36	0.412
DR5-3792#1	5.54	0.00	0.00	3.45	2.08	0.10	5.59	0.376
DR5-3822#1	5.54	0.00	0.00	3.29	2.24	0.31	14.38	0.404
DR5-3826#1	5.54	0.00	0.00	2.91	2.61	0.04	2.21	0.472
DR5-3844#1	5.54	0.00	0.00	0.09	5.42	0.09	4.19	0.978
DR5-3857#1	5.54	0.00	0.00	1.73	3.79	0.44	19.94	0.685
DR5-3859#1	5.54	0.00	0.00	0.18	5.33	0.04	2.06	0.962
DR5-3866#1	5.54	0.00	0.00	3.57	1.96	0.59	27.94	0.354
DR5-3875#1	5.54	0.00	0.00	4.98	0.56	0.25	12.57	0.101
DR5-3886#1	5.54	0.00	0.00	3.21	2.32	0.52	25.57	0.419
DR5-3902#1	5.54	0.00	0.00	3.15	2.38	0.49	21.82	0.429
DR5-3903#1	5.54	0.00	0.00	1.42	4.10	0.05	3.07	0.741
DR5-3905#1	5.54	0.00	0.00	3.76	1.77	0.15	7.70	0.320
DR5-3911#1	5.54	0.00	0.00	0.14	5.38	0.09	4.23	0.970
DR5-3916#1	5.54	0.00	0.00	1.76	3.76	0.40	17.68	0.680
DR5-3932#1	5.54	0.00	0.00	2.72	2.80	0.08	4.46	0.506
DR5-3934#1	5.54	0.00	0.00	1.30	4.22	0.11	5.34	0.762
DR5-3938#1	5.54	0.00	0.00	1.47	4.05	0.47	21.49	0.730
DR5-3961#1	5.54	0.00	0.00	1.31	4.21	0.09	4.55	0.760

## Briarfield10yrtwExisting-10yr24hr

DR5-3966#1	5.54	0.00	0.00	0.58	4.94	0.30	13.96	0.891
DR5-3968#1	5.54	0.00	0.00	0.70	4.81	0.42	16.03	0.868
DR5-3971#1	5.54	0.00	0.00	0.57	4.95	0.12	6.30	0.893
DR5-4196#1	5.54	0.00	0.00	3.06	2.46	0.23	10.70	0.445
DR5-4206#1	5.54	0.00	0.00	2.84	2.68	0.01	0.30	0.485
DR5-4218#1	5.54	0.00	0.00	3.22	2.31	0.03	1.88	0.417
DR5-4222#1	5.54	0.00	0.00	3.70	1.83	0.25	11.67	0.330
DR5-4224#1	5.54	0.00	0.00	3.13	2.40	0.03	1.35	0.434
DR5-4225#1	5.54	0.00	0.00	2.58	2.95	0.22	11.51	0.532
DR5-4230#1	5.54	0.00	0.00	3.47	2.06	0.43	20.18	0.372
DR5-4236#1	5.54	0.00	0.00	4.41	1.12	0.12	5.94	0.202
DR5-4281#1	5.54	0.00	0.00	2.82	2.70	0.03	1.83	0.488
DR5-4282#1	5.54	0.00	0.00	2.82	2.70	0.05	2.77	0.488
DR5-4293#1	5.54	0.00	0.00	2.62	2.91	0.03	1.67	0.525
DR5-4298#1	5.54	0.00	0.00	3.61	1.92	1.01	38.16	0.346
DR5-4302#1	5.54	0.00	0.00	0.49	5.02	0.33	13.41	0.907
DR5-4305#1	5.54	0.00	0.00	1.68	3.83	0.88	33.39	0.692
DR5-4307#1	5.54	0.00	0.00	1.83	3.69	0.48	23.19	0.666
DR5-4310#1	5.54	0.00	0.00	1.32	4.20	1.82	67.02	0.758
DR5-4311#1	5.54	0.00	0.00	0.90	4.62	0.03	1.48	0.834
DR5-4314#1	5.54	0.00	0.00	1.87	3.65	0.25	12.20	0.659
DR5-4315#1	5.54	0.00	0.00	1.51	4.00	2.02	66.54	0.722
DR5-4317#1	5.54	0.00	0.00	0.33	5.18	0.23	10.35	0.935
DR5-4323#1	5.54	0.00	0.00	2.58	2.95	0.02	1.78	0.532
DR5-4327#1	5.54	0.00	0.00	1.21	4.30	0.22	9.63	0.777
DR5-4328#1	5.54	0.00	0.00	2.36	3.17	0.41	18.14	0.571
DR5-4344#1	5.54	0.00	0.00	2.17	3.35	0.04	2.73	0.605
DR5-4351#1	5.54	0.00	0.00	3.20	2.33	0.05	2.62	0.421
DR5-4355#1	5.54	0.00	0.00	2.97	2.56	0.12	6.27	0.461
DR5-4356#1	5.54	0.00	0.00	3.83	1.71	0.04	2.00	0.308
DR5-4357#1	5.54	0.00	0.00	3.82	1.71	0.01	0.70	0.309
DR5-4358#1	5.54	0.00	0.00	3.78	1.75	0.01	0.80	0.316
DR5-4360#1	5.54	0.00	0.00	2.45	3.07	0.12	6.22	0.554
DR5-4633#1	5.54	0.00	0.00	3.21	2.32	0.09	5.13	0.418
DR5-4634#1	5.54	0.00	0.00	2.14	3.39	0.10	5.52	0.612
DR5-4657#1	5.54	0.00	0.00	1.23	4.29	0.11	5.50	0.774
DR5-4658#1	5.54	0.00	0.00	2.26	3.26	0.49	21.27	0.589
DR5-5300#1	5.54	0.00	0.00	3.47	2.06	0.01	1.00	0.373
DR5-5354#1	5.54	0.00	0.00	3.04	2.49	1.52	56.25	0.449
DR5-5364#1	5.54	0.00	0.00	2.48	3.05	0.10	5.18	0.550
DR5-5365#1	5.54	0.00	0.00	2.51	3.01	0.06	3.27	0.544
DR5-5366#1	5.54	0.00	0.00	3.04	2.49	0.11	5.59	0.450
DR5-5367#1	5.54	0.00	0.00	2.31	3.21	0.04	2.42	0.580
DR5-5368#1	5.54	0.00	0.00	1.13	4.39	0.32	16.14	0.793

Briarfield10yrtwExisting-10yr24hr

DR5-5388#1	5.54	0.00	0.00	3.78	1.75	0.04	2.85	0.317
Pond#1	5.54	0.00	0.00	2.33	3.20	0.76	36.87	0.577

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Node Depth Summary

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Node	Type	Average	Maximum	Maximum	Time of Max	days	hr:min
		Depth	Depth	HGL	Occurrence		
DR5-0474	JUNCTION	1.43	5.01	9.41	0 12:47		
DR5-0498	JUNCTION	1.35	2.70	6.77	0 12:08		
DR5-0504	JUNCTION	1.90	6.22	9.67	0 12:01		
DR5-0524	JUNCTION	0.69	5.70	12.35	0 12:10		
DR5-0572	JUNCTION	5.41	7.71	7.53	0 12:31		
DR5-0584	JUNCTION	3.12	4.02	5.85	0 12:14		
DR5-0593	JUNCTION	3.81	4.63	5.66	0 12:19		
DR5-0599	JUNCTION	5.35	8.08	7.97	0 12:31		
DR5-0603	JUNCTION	3.29	4.20	6.45	0 13:26		
DR5-0648	JUNCTION	5.01	7.86	8.15	0 12:11		
DR5-0661	JUNCTION	0.78	6.14	11.31	0 12:12		
DR5-0681	JUNCTION	4.77	8.84	9.41	0 12:11		
DR5-0689	JUNCTION	0.21	6.92	16.51	0 11:56		
DR5-0690	JUNCTION	0.16	3.46	13.13	0 11:57		
DR5-0691	JUNCTION	1.26	4.86	9.23	0 12:17		
DR5-0703	JUNCTION	0.46	1.63	9.09	0 12:45		
DR5-0704	JUNCTION	0.15	0.92	8.19	0 13:01		
DR5-0712	JUNCTION	0.21	3.44	13.78	0 12:07		
DR5-0714	JUNCTION	4.60	8.98	9.73	0 12:10		
DR5-0715	JUNCTION	0.50	4.80	13.00	0 13:09		
DR5-0716	JUNCTION	0.53	4.39	12.70	0 12:19		
DR5-0718	JUNCTION	0.55	4.61	12.98	0 12:13		
DR5-0724	JUNCTION	3.85	5.66	7.19	0 12:22		
DR5-0730	JUNCTION	4.42	5.52	6.21	0 12:16		
DR5-0737	JUNCTION	0.28	3.74	14.11	0 12:07		
DR5-0738	JUNCTION	2.92	6.46	9.92	0 12:14		
DR5-0739	JUNCTION	3.09	6.56	9.84	0 12:14		
DR5-0744	JUNCTION	0.55	4.05	14.16	0 12:07		
DR5-0751	JUNCTION	2.32	4.59	7.73	0 12:20		
DR5-0754	JUNCTION	4.39	9.13	10.11	0 12:09		
DR5-0769	JUNCTION	1.58	4.26	8.20	0 12:10		

## Briarfield10yrtwExisting-10yr24hr

DR5-0772	JUNCTION	0.26	3.60	9.00	0	12:41
DR5-0781	JUNCTION	1.59	3.74	7.59	0	12:20
DR5-0782	JUNCTION	6.69	7.69	7.59	0	12:48
DR5-0783	JUNCTION	4.46	6.44	8.87	0	12:08
DR5-0784	JUNCTION	3.14	5.20	7.33	0	12:26
DR5-0790	JUNCTION	1.50	3.73	7.68	0	12:17
DR5-0792	JUNCTION	6.51	7.53	7.62	0	12:46
DR5-0794	JUNCTION	3.93	5.47	6.70	0	12:21
DR5-0800	JUNCTION	1.37	2.81	6.81	0	12:20
DR5-0805	JUNCTION	0.15	1.77	8.15	0	12:06
DR5-0806	JUNCTION	0.16	1.67	8.64	0	12:06
DR5-0808	JUNCTION	0.27	4.71	11.95	0	12:08
DR5-0809	JUNCTION	2.29	3.43	7.97	0	12:15
DR5-0810	JUNCTION	5.49	6.78	7.94	0	12:14
DR5-0814	JUNCTION	0.11	0.94	9.94	0	12:00
DR5-0818	JUNCTION	0.18	4.30	12.01	0	12:08
DR5-0830	JUNCTION	1.80	4.56	8.19	0	12:11
DR5-0833	JUNCTION	0.11	4.01	12.01	0	12:10
DR5-0840	JUNCTION	0.05	0.72	8.47	0	12:00
DR5-0841	JUNCTION	0.45	3.83	9.04	0	12:12
DR5-0852	JUNCTION	0.16	1.57	10.54	0	12:00
DR5-0855	JUNCTION	0.35	2.95	8.20	0	12:09
DR5-0858	JUNCTION	0.06	0.67	10.42	0	12:06
DR5-0867	JUNCTION	0.08	1.07	8.46	0	12:00
DR5-0868	JUNCTION	0.14	1.21	9.10	0	12:00
DR5-0873	JUNCTION	1.10	7.74	12.36	0	12:09
DR5-0874	JUNCTION	0.17	1.34	8.46	0	12:22
DR5-0875	JUNCTION	0.61	2.43	8.45	0	12:22
DR5-0876	JUNCTION	0.15	1.43	11.43	0	12:00
DR5-0888	JUNCTION	0.12	1.07	9.83	0	12:00
DR5-0889	JUNCTION	0.11	1.03	10.03	0	12:00
DR5-0896	JUNCTION	0.30	2.12	8.45	0	12:22
DR5-0898	JUNCTION	0.72	5.90	11.01	0	12:11
DR5-0907	JUNCTION	0.83	7.70	12.67	0	11:56
DR5-0914	JUNCTION	0.68	7.61	12.83	0	12:09
DR5-0916	JUNCTION	0.26	2.42	8.43	0	12:21
DR5-0925	JUNCTION	0.57	5.67	11.64	0	12:19
DR5-0932	JUNCTION	0.06	0.55	9.55	0	12:00
DR5-0936	JUNCTION	0.33	2.98	8.42	0	12:20
DR5-0939	JUNCTION	2.63	5.10	7.86	0	12:27
DR5-0942	JUNCTION	0.18	1.54	8.74	0	12:00
DR5-0947	JUNCTION	0.55	7.40	13.00	0	11:55
DR5-0949	JUNCTION	0.13	1.17	8.58	0	12:28
DR5-0951	JUNCTION	0.22	2.15	9.80	0	12:00

## Briarfield10yrtwExisting-10yr24hr

DR5-0958	JUNCTION	0.45	5.50	12.83	0	11:50
DR5-0966	JUNCTION	0.54	7.83	13.89	0	11:55
DR5-0973	JUNCTION	0.52	6.89	13.24	0	12:09
DR5-0981	JUNCTION	2.21	5.06	8.40	0	12:25
DR5-0983	JUNCTION	0.72	6.87	13.25	0	12:17
DR5-0988	JUNCTION	0.51	6.78	13.30	0	12:10
DR5-0991	JUNCTION	0.71	6.82	13.44	0	12:18
DR5-0992	JUNCTION	0.50	6.76	13.39	0	11:55
DR5-0998	JUNCTION	2.17	5.03	8.41	0	12:25
DR5-0999	JUNCTION	1.86	4.85	8.57	0	12:25
DR5-1004	JUNCTION	0.49	6.60	13.42	0	12:10
DR5-1005	JUNCTION	0.21	5.93	13.43	0	12:11
DR5-1007	JUNCTION	1.48	4.45	8.57	0	12:24
DR5-1010	JUNCTION	0.33	2.82	8.81	0	12:11
DR5-1012	JUNCTION	0.50	4.17	10.21	0	12:04
DR5-1017	JUNCTION	0.30	2.78	8.60	0	12:23
DR5-1028	JUNCTION	0.66	3.59	9.24	0	12:23
DR5-1032	JUNCTION	0.48	4.98	13.95	0	12:31
DR5-1033	JUNCTION	0.47	4.82	13.99	0	12:31
DR5-1034	JUNCTION	0.46	5.71	13.06	0	12:08
DR5-1035	JUNCTION	0.43	5.50	13.17	0	12:07
DR5-1311	JUNCTION	5.03	5.72	5.86	0	11:54
DR5-1334	JUNCTION	1.10	4.00	8.37	0	12:01
DR5-1350	JUNCTION	3.83	6.97	8.37	0	11:54
DR5-1361	JUNCTION	1.13	6.07	11.77	0	12:24
DR5-1363	JUNCTION	3.54	6.84	8.54	0	11:54
DR5-1371	JUNCTION	0.21	3.97	11.77	0	11:55
DR5-1372	JUNCTION	0.17	3.80	11.13	0	11:55
DR5-1378	JUNCTION	0.25	3.68	10.46	0	12:05
DR5-1379	JUNCTION	2.10	3.39	6.67	0	12:06
DR5-1391	JUNCTION	0.69	5.74	12.02	0	12:27
DR5-1395	JUNCTION	2.83	7.43	9.91	0	11:54
DR5-1396	JUNCTION	0.19	3.80	10.73	0	12:07
DR5-1404	JUNCTION	0.13	4.95	11.09	0	12:00
DR5-1405	JUNCTION	2.53	6.56	9.34	0	12:01
DR5-1408	JUNCTION	2.37	6.45	9.40	0	12:01
DR5-1409	JUNCTION	1.07	6.45	10.84	0	11:54
DR5-1429	JUNCTION	0.96	6.67	11.22	0	11:54
DR5-1464	JUNCTION	0.32	6.15	11.93	0	11:54
DR5-1493	JUNCTION	1.26	3.63	7.83	0	12:09
DR5-1518	JUNCTION	0.35	5.85	12.88	0	11:55
DR5-1522	JUNCTION	1.92	3.97	7.45	0	12:11
DR5-1530	JUNCTION	2.58	4.60	7.39	0	12:08
DR5-1531	JUNCTION	4.13	5.08	6.22	0	12:10

## Briarfield10yrtwExisting-10yr24hr

DR5-1533	JUNCTION	0.20	4.84	12.74	0	11:56
DR5-1554	JUNCTION	0.77	4.99	10.09	0	12:24
DR5-1555	JUNCTION	0.24	4.81	13.39	0	11:56
DR5-1557	JUNCTION	0.58	4.57	9.79	0	12:25
DR5-1591	JUNCTION	0.42	4.53	13.29	0	12:16
DR5-1596	JUNCTION	0.43	4.58	13.20	0	12:17
DR5-1597	JUNCTION	2.36	6.11	10.16	0	12:06
DR5-1607	JUNCTION	0.95	4.36	9.76	0	12:10
DR5-1614	JUNCTION	5.68	6.94	7.54	0	12:24
DR5-1615	JUNCTION	0.18	2.82	9.32	0	12:05
DR5-1623	JUNCTION	3.74	4.21	6.82	0	12:05
DR5-1626	JUNCTION	3.23	4.28	7.42	0	12:05
DR5-1629	JUNCTION	2.41	7.73	10.84	0	12:07
DR5-1632	JUNCTION	0.26	6.30	12.04	0	12:25
DR5-1633	JUNCTION	4.84	5.84	7.49	0	12:58
DR5-1636	JUNCTION	3.85	5.17	7.66	0	12:24
DR5-1637	JUNCTION	4.02	5.00	7.50	0	12:57
DR5-1640	JUNCTION	0.25	5.72	12.05	0	11:54
DR5-1646	JUNCTION	3.40	8.72	10.77	0	12:07
DR5-1647	JUNCTION	1.20	2.72	7.99	0	12:08
DR5-1657	JUNCTION	6.03	7.12	7.71	0	12:42
DR5-1659	JUNCTION	5.90	7.01	7.73	0	12:40
DR5-1672	JUNCTION	1.83	7.66	11.42	0	12:09
DR5-1689	JUNCTION	0.35	4.40	9.97	0	12:08
DR5-1694	JUNCTION	1.43	3.82	7.83	0	12:13
DR5-1698	JUNCTION	1.38	4.41	8.52	0	12:06
DR5-1701	JUNCTION	1.28	7.59	12.00	0	12:09
DR5-1704	JUNCTION	1.14	7.73	12.30	0	12:09
DR5-1705	JUNCTION	1.55	5.69	9.69	0	12:37
DR5-1707	JUNCTION	1.52	6.37	10.45	0	12:11
DR5-1732	JUNCTION	0.74	7.15	12.70	0	12:09
DR5-1738	JUNCTION	0.55	7.11	13.04	0	12:07
DR5-1754	JUNCTION	0.71	6.78	13.59	0	12:18
DR5-1757	JUNCTION	0.87	6.78	13.66	0	12:17
DR5-1760	JUNCTION	0.81	8.93	16.53	0	12:16
DR5-1779	JUNCTION	0.43	6.25	13.54	0	12:09
DR5-1780	JUNCTION	0.44	5.12	13.77	0	12:09
DR5-1781	JUNCTION	0.34	2.63	8.61	0	12:23
DR5-1787	JUNCTION	0.23	1.89	8.96	0	12:01
DR5-1792	JUNCTION	0.60	5.05	11.43	0	12:08
DR5-1795	JUNCTION	0.18	1.48	9.63	0	12:01
DR5-1796	JUNCTION	0.59	6.00	12.61	0	12:08
DR5-1797	JUNCTION	0.51	4.73	14.14	0	12:16
DR5-1799	JUNCTION	0.50	4.77	14.24	0	12:17

## Briarfield10yrtwExisting-10yr24hr

DR5-1802	JUNCTION	0.32	5.51	13.86	0	11:56
DR5-1803	JUNCTION	0.14	3.86	13.36	0	12:08
DR5-1804	JUNCTION	0.16	1.30	10.54	0	12:06
DR5-1805	JUNCTION	0.44	5.76	12.94	0	12:08
DR5-1809	JUNCTION	0.21	4.31	13.69	0	12:13
DR5-1810	JUNCTION	0.17	4.19	13.69	0	12:14
DR5-1811	JUNCTION	0.24	4.54	13.69	0	12:13
DR5-1812	JUNCTION	0.56	4.95	14.59	0	12:14
DR5-1819	JUNCTION	0.18	4.03	14.03	0	11:57
DR5-1940	JUNCTION	0.93	5.80	14.77	0	12:43
DR5-1943	JUNCTION	3.45	4.57	5.57	0	14:35
DR5-1955	JUNCTION	2.93	5.37	7.04	0	11:57
DR5-2033	JUNCTION	2.54	5.35	8.24	0	12:00
DR5-2087	JUNCTION	0.19	4.01	11.79	0	12:03
DR5-2091	JUNCTION	0.14	4.65	11.85	0	11:54
DR5-2092	JUNCTION	0.08	2.98	11.57	0	12:06
DR5-2096	JUNCTION	1.67	7.74	11.69	0	12:09
DR5-2097	JUNCTION	1.72	7.77	11.67	0	12:09
DR5-2192	JUNCTION	2.28	3.55	6.64	0	12:06
DR5-2221	JUNCTION	0.26	2.05	8.43	0	12:20
DR5-2239	JUNCTION	4.55	5.69	5.51	0	14:21
DR5-2240	JUNCTION	3.99	4.97	5.57	0	14:33
DR5-2241	JUNCTION	1.74	5.31	8.30	0	11:59
DR5-2242	JUNCTION	1.44	5.36	8.80	0	11:57
DR5-2259	JUNCTION	0.07	0.76	8.85	0	12:25
DR5-2260	JUNCTION	0.16	1.44	9.35	0	12:01
DR5-2261	JUNCTION	0.45	3.33	8.65	0	12:13
DR5-2262	JUNCTION	0.78	4.02	8.95	0	12:14
DR5-2263	JUNCTION	0.99	4.14	8.82	0	12:14
DR5-2264	JUNCTION	1.11	4.29	8.83	0	12:14
DR5-2846	JUNCTION	0.21	1.78	7.12	0	12:00
DR5-2848	JUNCTION	0.10	0.94	6.94	0	12:00
DR5-2852	JUNCTION	0.16	1.74	7.74	0	12:00
DR5-2864	JUNCTION	2.32	3.76	7.01	0	12:47
DR5-2879	JUNCTION	4.51	5.75	6.25	0	12:09
DR5-2884	JUNCTION	4.23	6.00	7.92	0	12:19
DR5-2886	JUNCTION	2.47	4.63	7.46	0	12:10
DR5-2887	JUNCTION	3.92	6.27	8.53	0	12:10
DR5-2890	JUNCTION	2.05	4.31	7.69	0	12:09
DR5-2900	JUNCTION	1.21	4.05	8.54	0	12:19
DR5-2905	JUNCTION	1.33	4.58	8.94	0	12:19
DR5-2914	JUNCTION	0.56	3.57	9.06	0	12:06
DR5-2917	JUNCTION	0.62	2.73	8.10	0	12:06
DR5-3028	JUNCTION	0.70	3.57	8.57	0	12:24

## Briarfield10yrtwExisting-10yr24hr

DR5-3029	JUNCTION	0.13	1.07	11.57	0	12:00
DR5-3036	JUNCTION	0.07	0.75	10.75	0	12:00
DR5-3039	JUNCTION	0.22	3.25	9.54	0	12:26
DR5-3042	JUNCTION	0.15	1.23	10.27	0	12:00
DR5-3043	JUNCTION	0.05	1.11	9.35	0	12:01
DR5-3044	JUNCTION	0.65	3.45	10.00	0	11:54
DR5-3045	JUNCTION	0.64	3.43	10.30	0	12:05
DR5-3052	JUNCTION	0.51	3.68	10.75	0	11:52
DR5-3056	JUNCTION	0.42	5.07	14.57	0	12:09
DR5-3058	JUNCTION	0.31	4.48	12.39	0	11:49
DR5-3061	JUNCTION	0.45	4.20	11.67	0	11:52
DR5-3068	JUNCTION	0.70	6.82	13.76	0	12:17
DR5-3069	JUNCTION	0.49	4.62	13.08	0	12:17
DR5-3072	JUNCTION	0.61	3.92	12.00	0	12:08
DR5-3077	JUNCTION	0.55	4.20	12.85	0	12:33
DR5-3080	JUNCTION	0.58	4.44	13.42	0	12:33
DR5-3085	JUNCTION	0.69	5.52	14.64	0	12:44
DR5-3109	JUNCTION	3.38	3.72	5.72	0	11:59
DR5-3123	JUNCTION	4.81	5.81	7.10	0	12:28
DR5-3124	JUNCTION	4.15	5.42	6.29	0	12:09
DR5-3125	JUNCTION	3.91	5.46	6.60	0	12:16
DR5-3127	JUNCTION	3.63	5.29	6.75	0	12:14
DR5-3176	JUNCTION	0.19	5.42	13.68	0	11:55
DR5-3217	JUNCTION	0.71	5.91	14.09	0	12:30
DR5-3218	JUNCTION	0.38	4.80	14.80	0	12:11
DR5-3219	JUNCTION	1.04	6.13	15.02	0	12:31
DR5-3229	JUNCTION	1.15	6.71	15.53	0	12:16
DR5-3651	JUNCTION	4.72	6.58	7.04	0	11:54
DR5-3654	JUNCTION	3.88	6.37	7.71	0	11:54
DR5-3666	JUNCTION	1.22	6.08	10.84	0	12:32
DR5-3672	JUNCTION	0.67	5.61	11.56	0	12:25
DR5-3697	JUNCTION	0.10	2.24	11.85	0	12:06
DR5-3723	JUNCTION	0.14	2.40	9.07	0	11:59
DR5-3724	JUNCTION	0.36	4.12	10.89	0	12:06
DR5-3726	JUNCTION	3.95	5.39	6.75	0	13:21
DR5-3740	JUNCTION	0.10	0.96	11.72	0	12:00
DR5-3746	JUNCTION	0.46	5.88	10.94	0	12:01
DR5-3750	JUNCTION	0.24	2.59	12.59	0	12:11
DR5-3757	JUNCTION	0.61	5.52	12.11	0	12:26
DR5-3792	JUNCTION	4.14	4.92	5.69	0	12:14
DR5-3822	JUNCTION	0.88	5.64	10.45	0	13:18
DR5-3826	JUNCTION	0.27	3.10	9.14	0	12:09
DR5-3844	JUNCTION	4.14	9.29	10.54	0	12:08
DR5-3857	JUNCTION	3.51	3.94	7.01	0	12:03

## Briarfield10yrtwExisting-10yr24hr

DR5-3859	JUNCTION	4.09	9.32	10.64	0	12:08
DR5-3866	JUNCTION	1.34	4.19	8.34	0	12:05
DR5-3874	JUNCTION	0.65	2.17	8.01	0	12:07
DR5-3875	JUNCTION	0.27	1.90	8.15	0	12:06
DR5-3879	JUNCTION	3.77	5.37	6.79	0	12:20
DR5-3885	JUNCTION	3.29	5.44	7.40	0	12:18
DR5-3886	JUNCTION	3.11	5.36	7.51	0	12:17
DR5-3887	JUNCTION	2.07	4.33	7.60	0	12:16
DR5-3902	JUNCTION	0.22	2.12	8.22	0	12:00
DR5-3903	JUNCTION	1.67	6.17	10.00	0	12:37
DR5-3905	JUNCTION	0.26	2.22	8.22	0	12:12
DR5-3911	JUNCTION	0.16	1.81	8.22	0	12:13
DR5-3914	JUNCTION	0.01	0.22	9.64	0	12:06
DR5-3916	JUNCTION	1.32	6.59	10.92	0	12:10
DR5-3926	JUNCTION	0.13	1.69	8.57	0	12:28
DR5-3932	JUNCTION	0.72	7.00	13.00	0	12:40
DR5-3934	JUNCTION	0.53	6.96	13.19	0	12:08
DR5-3938	JUNCTION	0.43	4.92	12.76	0	12:21
DR5-3961	JUNCTION	0.51	5.13	13.99	0	12:33
DR5-3966	JUNCTION	0.37	6.13	14.04	0	11:57
DR5-3968	JUNCTION	0.45	4.78	14.51	0	12:15
DR5-3971	JUNCTION	0.56	4.81	14.33	0	12:22
DR5-4196	JUNCTION	3.49	7.20	8.97	0	11:54
DR5-4206	JUNCTION	0.32	5.51	12.30	0	11:55
DR5-4218	JUNCTION	2.59	3.57	5.96	0	12:09
DR5-4222	JUNCTION	2.13	3.15	6.04	0	12:40
DR5-4224	JUNCTION	3.67	4.63	5.80	0	12:16
DR5-4225	JUNCTION	2.59	3.48	6.48	0	13:44
DR5-4230	JUNCTION	3.63	4.62	5.84	0	12:14
DR5-4236	JUNCTION	0.38	4.26	12.18	0	11:56
DR5-4281	JUNCTION	3.66	6.32	9.00	0	12:14
DR5-4282	JUNCTION	3.84	6.25	8.74	0	12:14
DR5-4293	JUNCTION	1.39	4.70	8.90	0	12:05
DR5-4298	JUNCTION	1.17	4.48	8.89	0	12:05
DR5-4302	JUNCTION	0.54	5.33	12.15	0	12:21
DR5-4305	JUNCTION	0.56	5.57	12.57	0	12:18
DR5-4307	JUNCTION	0.16	2.28	10.98	0	12:00
DR5-4310	JUNCTION	0.75	7.18	12.63	0	12:09
DR5-4311	JUNCTION	0.66	6.55	12.39	0	12:23
DR5-4314	JUNCTION	0.60	4.50	10.70	0	12:07
DR5-4315	JUNCTION	0.83	7.62	13.69	0	12:09
DR5-4317	JUNCTION	0.42	6.08	13.58	0	12:11
DR5-4323	JUNCTION	0.59	5.48	11.98	0	12:08
DR5-4327	JUNCTION	0.27	3.65	12.15	0	12:09

## Briarfield10yrtwExisting-10yr24hr

DR5-4328	JUNCTION	0.23	3.56	12.22	0	12:09
DR5-4343	JUNCTION	0.10	0.93	8.63	0	12:24
DR5-4344	JUNCTION	0.34	3.15	8.62	0	12:25
DR5-4345	JUNCTION	1.35	4.30	8.57	0	12:26
DR5-4351	JUNCTION	1.28	5.06	8.70	0	11:59
DR5-4355	JUNCTION	0.26	4.21	9.41	0	11:59
DR5-4356	JUNCTION	0.56	5.05	9.80	0	11:58
DR5-4357	JUNCTION	0.69	4.78	9.32	0	11:59
DR5-4358	JUNCTION	0.79	4.92	9.32	0	12:00
DR5-4360	JUNCTION	2.93	6.72	9.07	0	11:54
DR5-4633	JUNCTION	0.61	3.05	7.93	0	12:01
DR5-4634	JUNCTION	4.43	5.51	6.36	0	12:06
DR5-4657	JUNCTION	0.18	1.36	6.71	0	12:00
DR5-4658	JUNCTION	0.13	1.12	8.12	0	12:00
DR5-5300	JUNCTION	0.04	0.67	10.88	0	12:00
DR5-5354	JUNCTION	0.88	5.79	11.74	0	12:22
DR5-5364	JUNCTION	0.54	5.69	12.26	0	11:55
DR5-5365	JUNCTION	0.43	5.05	11.74	0	11:55
DR5-5366	JUNCTION	0.36	4.39	11.17	0	12:07
DR5-5367	JUNCTION	0.27	4.29	11.24	0	12:08
DR5-5368	JUNCTION	0.19	3.97	11.27	0	12:10
DR5-5388	JUNCTION	1.79	5.22	9.04	0	12:13
MN01	JUNCTION	0.39	3.16	8.60	0	12:23
MN02	JUNCTION	1.26	4.27	8.67	0	12:26
DR5-0506	OUTFALL	1.50	1.50	5.50	0	00:00
DR5-0571	OUTFALL	6.28	6.28	5.65	0	00:00
DR5-0592	OUTFALL	5.50	5.50	5.50	0	00:00
DR5-0608	OUTFALL	6.36	6.36	5.50	0	00:00
DR5-0640	OUTFALL	6.20	6.20	6.20	0	00:00
DR5-0642	OUTFALL	5.17	5.17	5.52	0	00:00
DR5-0729	OUTFALL	4.83	4.83	5.50	0	00:00
DR5-0741	OUTFALL	4.83	4.83	6.51	0	00:00
DR5-0774	OUTFALL	5.83	5.83	6.52	0	00:00
DR5-2238	OUTFALL	6.50	6.50	5.50	0	00:00
DR5-2837	OUTFALL	6.00	6.00	5.50	0	00:00
DR5-2845	OUTFALL	0.51	1.70	6.70	0	12:00
DR5-2847	OUTFALL	2.50	2.50	5.50	0	00:00
DR5-2863	OUTFALL	3.48	3.48	5.50	0	00:00
DR5-3644	OUTFALL	5.50	5.50	5.50	0	00:00
DR5-3725	OUTFALL	4.81	4.81	5.50	0	00:00
DR5-3791	OUTFALL	5.50	5.50	5.50	0	00:00
DR5-3810	OUTFALL	5.25	5.25	6.45	0	00:00
DR5-3810_1	OUTFALL	5.25	5.25	6.45	0	00:00
DR5-3833	OUTFALL	7.39	7.39	7.49	0	00:00

Briarfield10yrtwExisting-10yr24hr

DR5-3842	OUTFALL	5.97	5.97	7.50	0	00:00
DR5-3845	OUTFALL	7.90	7.90	7.48	0	00:00
DR5-3849	OUTFALL	7.90	7.90	7.52	0	00:00
DR5-3856	OUTFALL	8.86	8.86	6.80	0	00:00
DR5-4635	OUTFALL	5.50	5.50	5.50	0	00:00
DR5-4656	OUTFALL	2.72	2.72	5.50	0	00:00
Pond	STORAGE	4.59	5.53	5.53	0	14:35

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**Node Inflow Summary**

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Node	Type	Maximum			Lateral Inflow	Total Inflow	Total Volume	Flow Balance
		Lateral Inflow	Total Inflow	Time of Max Occurrence				
		CFS	CFS	days hr:min				
DR5-0474	JUNCTION	4.98	33.91	0 12:00	0.0904	3.01	0.044	
DR5-0498	JUNCTION	49.00	72.33	0 12:05	1.32	2.84	3.816	
DR5-0504	JUNCTION	14.14	29.44	0 12:00	0.304	0.681	0.704	
DR5-0524	JUNCTION	20.08	20.08	0 12:00	0.45	0.452	0.104	
DR5-0572	JUNCTION	2.27	142.12	0 12:06	0.0413	6.13	0.389	
DR5-0584	JUNCTION	1.89	11.35	0 11:56	0.0227	0.305	1.610	
DR5-0593	JUNCTION	2.49	7.66	0 12:11	0.0282	0.298	1.404	
DR5-0599	JUNCTION	6.05	140.49	0 12:06	0.116	6.12	0.559	
DR5-0603	JUNCTION	0.00	11.51	0 12:00	0	0.219	10.956	
DR5-0648	JUNCTION	6.46	150.51	0 11:56	0.12	6.04	0.572	
DR5-0661	JUNCTION	52.75	52.75	0 12:00	1.18	1.18	0.023	
DR5-0681	JUNCTION	5.28	148.20	0 11:59	0.0978	5.95	0.548	
DR5-0689	JUNCTION	1.10	25.56	0 11:56	0.0205	0.609	0.002	
DR5-0690	JUNCTION	4.04	13.74	0 11:56	0.0776	0.0784	0.039	
DR5-0691	JUNCTION	10.21	31.18	0 11:56	0.206	2.03	0.141	
DR5-0703	JUNCTION	0.00	20.72	0 12:17	0	1.49	-0.015	
DR5-0704	JUNCTION	0.00	21.07	0 11:50	0	1.49	0.092	
DR5-0712	JUNCTION	8.78	21.35	0 11:56	0.186	0.51	-0.003	
DR5-0714	JUNCTION	8.16	146.39	0 12:01	0.16	5.89	0.641	
DR5-0715	JUNCTION	0.74	20.73	0 12:17	0.0127	1.49	0.002	
DR5-0716	JUNCTION	0.18	27.14	0 12:06	0.00253	1.47	0.002	
DR5-0718	JUNCTION	33.74	38.75	0 11:59	0.792	1.47	-0.008	
DR5-0724	JUNCTION	9.42	29.68	0 12:05	0.196	1.39	1.798	
DR5-0730	JUNCTION	175.02	542.75	0 12:15	5.97	39.9	1.088	
DR5-0737	JUNCTION	1.85	17.17	0 12:15	0.0345	0.323	0.021	

## Briarfield10yrtwExisting-10yr24hr

DR5-0738	JUNCTION	2.14	16.81	0 12:13	0.0396	0.403	0.531
DR5-0739	JUNCTION	6.85	19.79	0 12:07	0.14	0.541	0.418
DR5-0744	JUNCTION	14.93	14.93	0 12:00	0.289	0.289	0.002
DR5-0751	JUNCTION	1.92	33.42	0 12:00	0.0286	1.23	0.415
DR5-0754	JUNCTION	10.59	139.60	0 12:05	0.225	5.78	0.761
DR5-0769	JUNCTION	2.28	32.54	0 12:05	0.0354	1.2	0.122
DR5-0772	JUNCTION	1.76	30.55	0 12:05	0.0244	1.14	0.016
DR5-0781	JUNCTION	4.40	94.51	0 12:03	0.0805	4.65	0.283
DR5-0782	JUNCTION	0.71	5.61	0 12:44	0.00778	0.597	0.365
DR5-0783	JUNCTION	35.82	35.82	0 12:00	0.871	0.871	0.192
DR5-0784	JUNCTION	0.00	287.90	0 12:26	0	23.3	2.009
DR5-0790	JUNCTION	1.07	44.29	0 12:00	0.0169	1.48	0.120
DR5-0792	JUNCTION	1.28	9.70	0 11:57	0.0181	0.708	0.367
DR5-0794	JUNCTION	0.00	453.46	0 12:27	0	34.6	1.797
DR5-0800	JUNCTION	28.82	28.82	0 12:00	0.557	0.564	0.174
DR5-0805	JUNCTION	0.00	21.59	0 12:00	0	0.466	0.127
DR5-0806	JUNCTION	3.03	21.63	0 12:00	0.0281	0.424	-0.008
DR5-0808	JUNCTION	16.26	18.36	0 12:26	0.32	0.536	0.008
DR5-0809	JUNCTION	12.61	15.26	0 12:00	0.241	0.257	0.147
DR5-0810	JUNCTION	27.28	27.28	0 12:00	0.646	0.81	0.309
DR5-0814	JUNCTION	9.20	9.20	0 12:00	0.184	0.184	-0.026
DR5-0818	JUNCTION	8.90	15.65	0 12:00	0.175	0.217	0.007
DR5-0830	JUNCTION	0.00	149.91	0 12:01	0	7.65	1.081
DR5-0833	JUNCTION	1.75	9.85	0 11:54	0.0309	0.032	-0.220
DR5-0840	JUNCTION	0.00	9.19	0 12:00	0	0.184	-0.506
DR5-0841	JUNCTION	8.68	25.38	0 12:05	0.179	0.878	0.100
DR5-0852	JUNCTION	3.19	19.57	0 12:00	0.0488	0.396	0.001
DR5-0855	JUNCTION	0.00	52.16	0 12:00	0	1.09	0.227
DR5-0858	JUNCTION	3.64	3.64	0 12:05	0.0473	0.0473	-0.014
DR5-0867	JUNCTION	0.00	17.29	0 12:00	0	0.353	-0.139
DR5-0868	JUNCTION	17.40	17.40	0 12:00	0.353	0.353	-0.033
DR5-0873	JUNCTION	1.48	70.58	0 12:00	0.026	3.35	0.057
DR5-0874	JUNCTION	9.80	35.05	0 12:00	0.163	0.702	0.205
DR5-0875	JUNCTION	0.00	34.42	0 12:00	0	0.701	0.394
DR5-0876	JUNCTION	16.64	16.64	0 12:00	0.348	0.348	-0.001
DR5-0888	JUNCTION	5.85	18.92	0 12:00	0.109	0.367	-0.023
DR5-0889	JUNCTION	13.09	13.09	0 12:00	0.258	0.258	-0.000
DR5-0896	JUNCTION	8.54	40.34	0 12:01	0.156	0.855	-0.035
DR5-0898	JUNCTION	34.19	51.02	0 12:05	0.944	3.14	0.132
DR5-0907	JUNCTION	7.15	70.24	0 12:09	0.14	3.32	0.045
DR5-0914	JUNCTION	22.32	67.46	0 12:09	0.593	3.18	0.039
DR5-0916	JUNCTION	0.00	42.44	0 12:01	0	0.903	0.122
DR5-0925	JUNCTION	14.87	35.00	0 12:45	0.359	2.2	0.071
DR5-0932	JUNCTION	3.30	3.30	0 12:00	0.0536	0.0537	0.794

## Briarfield10yrtwExisting-10yr24hr

DR5-0936	JUNCTION	0.00	55.45	0 12:02	0	1.48	0.263
DR5-0939	JUNCTION	0.00	227.09	0 12:25	0	18.9	1.895
DR5-0942	JUNCTION	21.18	21.18	0 12:00	0.442	0.442	-0.011
DR5-0947	JUNCTION	3.35	60.89	0 12:26	0.0374	2.59	0.000
DR5-0949	JUNCTION	0.00	37.53	0 12:00	0	0.688	-0.085
DR5-0951	JUNCTION	10.49	33.61	0 12:00	0.206	0.688	-0.003
DR5-0958	JUNCTION	8.03	12.30	0 11:50	0.153	0.626	0.021
DR5-0966	JUNCTION	5.33	59.59	0 12:26	0.111	2.41	0.003
DR5-0973	JUNCTION	6.97	58.22	0 12:26	0.144	2.19	0.001
DR5-0981	JUNCTION	0.00	270.16	0 12:06	0	19.3	1.870
DR5-0983	JUNCTION	4.04	65.07	0 12:37	0.0716	3.63	0.000
DR5-0988	JUNCTION	3.89	57.34	0 12:26	0.0881	2.04	0.000
DR5-0991	JUNCTION	2.26	64.83	0 12:37	0.0431	3.56	0.000
DR5-0992	JUNCTION	8.27	56.69	0 12:26	0.178	1.96	0.014
DR5-0998	JUNCTION	0.00	153.59	0 12:32	0	14	0.117
DR5-0999	JUNCTION	107.26	255.02	0 12:05	3.19	14.7	1.268
DR5-1004	JUNCTION	6.83	55.65	0 12:24	0.145	1.79	0.030
DR5-1005	JUNCTION	1.22	13.26	0 11:55	0.0218	0.223	-0.084
DR5-1007	JUNCTION	0.00	24.03	0 12:05	0	0.0644	2.839
DR5-1010	JUNCTION	0.00	171.88	0 12:04	0	3.84	-0.234
DR5-1012	JUNCTION	11.36	124.31	0 12:05	0.244	3.84	-0.018
DR5-1017	JUNCTION	0.00	27.27	0 12:01	0	0.682	-0.008
DR5-1028	JUNCTION	0.00	50.38	0 12:03	0	3.76	-0.008
DR5-1032	JUNCTION	4.12	19.86	0 12:41	0.0734	0.924	0.151
DR5-1033	JUNCTION	5.01	36.92	0 12:42	0.0961	1.45	0.187
DR5-1034	JUNCTION	2.05	91.13	0 12:08	0.0379	2.96	-0.001
DR5-1035	JUNCTION	79.15	79.15	0 12:05	2.17	2.17	-0.000
DR5-1311	JUNCTION	5.32	130.66	0 12:00	0.0996	3.54	0.371
DR5-1334	JUNCTION	1.70	1.70	0 11:59	0.0261	0.0269	1.886
DR5-1350	JUNCTION	2.25	116.36	0 12:00	0.0392	3.33	0.567
DR5-1361	JUNCTION	5.04	23.94	0 12:00	0.0862	0.852	0.033
DR5-1363	JUNCTION	3.06	50.93	0 12:00	0.0523	1.1	1.401
DR5-1371	JUNCTION	8.06	12.59	0 12:11	0.166	0.427	0.001
DR5-1372	JUNCTION	1.35	17.76	0 11:59	0.0244	0.559	-0.008
DR5-1378	JUNCTION	5.80	15.81	0 12:14	0.164	0.483	0.007
DR5-1379	JUNCTION	1.94	77.07	0 12:11	0.0319	3.41	0.292
DR5-1391	JUNCTION	11.59	20.22	0 12:00	0.251	0.745	0.057
DR5-1395	JUNCTION	6.02	53.56	0 12:07	0.116	2.18	0.703
DR5-1396	JUNCTION	6.17	12.09	0 12:00	0.159	0.319	-0.041
DR5-1404	JUNCTION	13.11	13.11	0 12:00	0.268	0.268	-0.008
DR5-1405	JUNCTION	6.53	41.73	0 12:00	0.171	1.17	0.760
DR5-1408	JUNCTION	5.82	35.20	0 12:00	0.135	0.893	0.364
DR5-1409	JUNCTION	4.16	50.60	0 12:10	0.0739	2.07	0.216
DR5-1429	JUNCTION	9.51	49.70	0 12:13	0.191	1.84	0.157

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DR5-1464	JUNCTION	6.21	47.06	0 12:15	0.12	1.64	-0.002
DR5-1493	JUNCTION	18.52	18.52	0 12:00	0.365	0.366	0.617
DR5-1518	JUNCTION	3.41	33.65	0 11:58	0.0642	0.881	-0.002
DR5-1522	JUNCTION	2.91	10.65	0 12:06	0.0544	0.424	0.952
DR5-1530	JUNCTION	7.23	12.76	0 11:59	0.138	0.56	0.919
DR5-1531	JUNCTION	6.05	18.74	0 11:59	0.115	0.664	1.090
DR5-1533	JUNCTION	0.91	30.64	0 11:58	0.0171	0.817	0.012
DR5-1554	JUNCTION	6.64	29.36	0 12:06	0.175	1.35	0.020
DR5-1555	JUNCTION	3.78	26.29	0 11:56	0.0746	0.683	0.042
DR5-1557	JUNCTION	6.47	21.31	0 12:16	0.173	1.52	0.017
DR5-1591	JUNCTION	21.25	21.25	0 12:00	0.515	0.515	-0.003
DR5-1596	JUNCTION	7.73	16.33	0 12:01	0.163	0.679	0.005
DR5-1597	JUNCTION	18.17	18.17	0 12:00	0.364	0.364	0.422
DR5-1607	JUNCTION	30.46	30.46	0 12:00	0.67	0.67	0.092
DR5-1614	JUNCTION	10.50	16.44	0 12:00	0.212	0.594	0.571
DR5-1615	JUNCTION	15.90	15.90	0 12:00	0.387	0.388	-0.007
DR5-1623	JUNCTION	2.86	31.64	0 12:06	0.0506	0.837	0.504
DR5-1626	JUNCTION	3.54	29.29	0 12:07	0.0652	0.791	0.439
DR5-1629	JUNCTION	5.33	33.98	0 12:00	0.0985	0.989	0.921
DR5-1632	JUNCTION	2.18	29.11	0 12:25	0.0441	0.889	-0.011
DR5-1633	JUNCTION	3.97	12.52	0 12:00	0.0793	0.371	0.606
DR5-1636	JUNCTION	25.86	25.86	0 12:00	0.572	0.573	0.467
DR5-1637	JUNCTION	22.06	22.06	0 12:00	0.477	0.478	0.168
DR5-1640	JUNCTION	15.21	26.47	0 12:00	0.318	0.845	-0.012
DR5-1646	JUNCTION	14.94	126.48	0 11:59	0.3	4.52	0.587
DR5-1647	JUNCTION	3.19	35.24	0 11:59	0.0566	0.759	0.776
DR5-1657	JUNCTION	2.15	12.63	0 12:06	0.0398	0.731	0.323
DR5-1659	JUNCTION	2.77	16.78	0 12:06	0.0544	0.732	0.301
DR5-1672	JUNCTION	12.92	111.80	0 11:59	0.266	4.23	0.239
DR5-1689	JUNCTION	33.75	33.75	0 12:00	0.698	0.698	0.011
DR5-1694	JUNCTION	7.65	57.30	0 11:59	0.168	3.5	0.149
DR5-1698	JUNCTION	9.78	49.98	0 11:58	0.199	3.33	0.100
DR5-1701	JUNCTION	0.67	79.21	0 11:59	0.0113	3.51	0.107
DR5-1704	JUNCTION	7.97	78.59	0 12:00	0.157	3.5	0.031
DR5-1705	JUNCTION	9.68	105.81	0 11:57	0.213	6.52	0.045
DR5-1707	JUNCTION	6.43	104.47	0 12:06	0.13	6.31	0.037
DR5-1732	JUNCTION	11.61	66.32	0 12:37	0.242	3.96	0.003
DR5-1738	JUNCTION	7.37	60.38	0 12:26	0.144	2.55	0.001
DR5-1754	JUNCTION	5.88	63.08	0 12:39	0.121	3.52	0.000
DR5-1757	JUNCTION	5.51	57.42	0 12:40	0.11	3.41	0.011
DR5-1760	JUNCTION	68.03	68.03	0 12:05	1.81	1.81	0.024
DR5-1779	JUNCTION	9.99	59.61	0 12:27	0.212	1.43	0.016
DR5-1780	JUNCTION	25.19	30.20	0 12:06	0.59	1.53	0.185
DR5-1781	JUNCTION	7.07	27.66	0 12:01	0.144	0.682	-0.002

## Briarfield10yrtwExisting-10yr24hr

DR5-1787	JUNCTION	6.46	21.49	0 12:00	0.127	0.538	0.019
DR5-1792	JUNCTION	4.75	99.95	0 12:06	0.0814	3.35	-0.006
DR5-1795	JUNCTION	6.48	15.72	0 12:00	0.131	0.411	-0.020
DR5-1796	JUNCTION	10.32	97.71	0 12:08	0.198	3.24	-0.005
DR5-1797	JUNCTION	6.54	40.45	0 12:50	0.132	1.29	0.012
DR5-1799	JUNCTION	12.46	32.99	0 11:59	0.286	1.16	0.000
DR5-1802	JUNCTION	12.08	69.30	0 11:56	0.254	0.769	0.551
DR5-1803	JUNCTION	5.08	29.93	0 12:32	0.0989	0.748	-0.003
DR5-1804	JUNCTION	9.93	9.93	0 12:05	0.279	0.279	0.004
DR5-1805	JUNCTION	4.50	93.06	0 12:08	0.0856	3.04	0.004
DR5-1809	JUNCTION	6.33	33.38	0 12:35	0.131	0.315	-0.009
DR5-1810	JUNCTION	5.69	14.09	0 11:59	0.108	0.135	-0.033
DR5-1811	JUNCTION	1.43	48.55	0 11:56	0.0265	0.545	0.074
DR5-1812	JUNCTION	43.34	43.34	0 12:00	1.13	1.13	-0.003
DR5-1819	JUNCTION	7.74	16.02	0 11:57	0.17	0.173	0.568
DR5-1940	JUNCTION	2.27	18.03	0 13:53	0.043	1.39	0.004
DR5-1943	JUNCTION	0.00	8.81	0 14:33	0 0.553	-32.642	
DR5-1955	JUNCTION	13.29	46.18	0 12:00	0.283	0.907	1.571
DR5-2033	JUNCTION	14.31	16.01	0 11:59	0.269	0.296	0.801
DR5-2087	JUNCTION	14.84	14.84	0 12:00	0.309	0.309	-0.010
DR5-2091	JUNCTION	1.54	21.01	0 11:55	0.0258	0.427	0.019
DR5-2092	JUNCTION	4.73	9.75	0 11:54	0.0899	0.0908	-0.176
DR5-2096	JUNCTION	1.49	98.76	0 11:58	0.0289	4.67	-0.071
DR5-2097	JUNCTION	0.73	101.68	0 11:58	0.0135	4.68	0.288
DR5-2192	JUNCTION	1.41	77.74	0 12:11	0.025	3.42	0.224
DR5-2221	JUNCTION	5.92	26.98	0 12:00	0.119	0.561	0.003
DR5-2239	JUNCTION	2.49	10.62	0 12:06	0.0281	0.72	0.659
DR5-2240	JUNCTION	6.28	52.45	0 12:00	0.122	1.05	1.058
DR5-2241	JUNCTION	6.10	32.90	0 12:00	0.119	0.62	1.021
DR5-2242	JUNCTION	13.48	26.81	0 12:00	0.274	0.506	0.500
DR5-2259	JUNCTION	6.66	6.66	0 12:00	0.138	0.14	0.035
DR5-2260	JUNCTION	1.54	19.29	0 12:00	0.0289	0.427	0.158
DR5-2261	JUNCTION	3.81	40.06	0 12:00	0.0554	0.665	0.005
DR5-2262	JUNCTION	1.28	33.78	0 11:59	0.0171	0.68	0.396
DR5-2263	JUNCTION	1.95	30.33	0 11:59	0.0243	0.703	0.647
DR5-2264	JUNCTION	1.41	30.01	0 12:05	0.00991	0.709	0.851
DR5-2846	JUNCTION	2.36	22.86	0 12:00	0.0402	0.458	0.017
DR5-2848	JUNCTION	17.07	17.07	0 12:00	0.333	0.333	-0.000
DR5-2852	JUNCTION	20.56	20.56	0 12:00	0.418	0.418	-0.001
DR5-2864	JUNCTION	2.24	26.34	0 12:47	0.0337	3.05	0.182
DR5-2879	JUNCTION	0.00	28.05	0 12:11	0 1.02	29.507	
DR5-2884	JUNCTION	4.81	20.89	0 12:05	0.0915	0.836	0.593
DR5-2886	JUNCTION	4.88	40.50	0 11:58	0.0836	0.908	1.189
DR5-2887	JUNCTION	34.48	34.48	0 12:00	0.746	0.747	0.272

## Briarfield10yrtwExisting-10yr24hr

DR5-2890	JUNCTION	5.99	24.01	0 11:59	0.114	0.576	1.068
DR5-2900	JUNCTION	4.43	12.31	0 11:57	0.0736	0.261	1.973
DR5-2905	JUNCTION	5.18	18.03	0 11:56	0.0993	0.468	0.768
DR5-2914	JUNCTION	18.00	18.00	0 12:00	0.364	0.368	0.203
DR5-2917	JUNCTION	9.75	9.75	0 12:00	0.187	0.188	0.646
DR5-3028	JUNCTION	1.01	1.01	0 12:05	0.0128	0.0133	1.970
DR5-3029	JUNCTION	11.66	11.66	0 12:00	0.268	0.268	-0.000
DR5-3036	JUNCTION	0.00	11.64	0 12:00	0	0.268	0.044
DR5-3039	JUNCTION	0.00	264.19	0 12:23	0	6.85	0.478
DR5-3042	JUNCTION	6.76	19.09	0 12:00	0.13	0.398	-0.028
DR5-3043	JUNCTION	0.00	18.11	0 12:00	0	0.398	-0.166
DR5-3044	JUNCTION	43.42	108.25	0 12:00	0.934	5.31	-0.020
DR5-3045	JUNCTION	5.11	48.93	0 12:00	0.0969	3.59	-0.003
DR5-3052	JUNCTION	6.32	44.14	0 12:04	0.146	3.49	0.001
DR5-3056	JUNCTION	47.65	47.65	0 12:00	0.936	0.937	0.043
DR5-3058	JUNCTION	8.43	17.94	0 12:10	0.169	0.792	0.003
DR5-3061	JUNCTION	12.58	39.19	0 12:08	0.284	3.34	-0.000
DR5-3068	JUNCTION	11.35	23.14	0 11:59	0.226	1.75	0.096
DR5-3069	JUNCTION	14.33	30.13	0 12:00	0.267	1.2	-0.006
DR5-3072	JUNCTION	10.54	36.63	0 12:40	0.226	3.06	0.001
DR5-3077	JUNCTION	9.36	21.02	0 13:19	0.175	1.63	0.048
DR5-3080	JUNCTION	10.75	22.27	0 12:00	0.208	1.46	0.015
DR5-3085	JUNCTION	1.55	17.99	0 13:53	0.0288	1.42	0.010
DR5-3109	JUNCTION	10.52	10.52	0 12:00	0.187	0.187	0.746
DR5-3123	JUNCTION	3.78	14.34	0 12:06	0.0665	0.862	0.682
DR5-3124	JUNCTION	0.75	26.05	0 12:13	0.0129	1.08	0.390
DR5-3125	JUNCTION	2.13	28.81	0 12:03	0.0308	0.99	0.245
DR5-3127	JUNCTION	6.00	36.72	0 11:59	0.106	1.04	0.407
DR5-3176	JUNCTION	9.85	9.85	0 12:00	0.198	0.198	-0.034
DR5-3217	JUNCTION	3.92	18.90	0 13:28	0.0745	1.5	0.248
DR5-3218	JUNCTION	21.15	21.15	0 12:00	0.457	0.458	0.058
DR5-3219	JUNCTION	9.99	26.47	0 12:06	0.209	1.36	0.011
DR5-3229	JUNCTION	42.07	42.07	0 12:05	1.14	1.15	0.016
DR5-3651	JUNCTION	1.75	125.35	0 12:00	0.0341	3.48	0.466
DR5-3654	JUNCTION	7.20	123.57	0 12:00	0.131	3.45	0.393
DR5-3666	JUNCTION	13.90	37.10	0 12:06	0.331	2.92	0.009
DR5-3672	JUNCTION	10.92	40.93	0 12:06	0.251	2.59	0.026
DR5-3697	JUNCTION	1.97	7.01	0 11:55	0.0343	0.26	-0.011
DR5-3723	JUNCTION	6.23	20.32	0 11:59	0.149	0.632	-0.011
DR5-3724	JUNCTION	8.98	8.98	0 11:59	0.16	0.16	0.006
DR5-3726	JUNCTION	50.10	115.06	0 12:06	1.14	4.47	0.344
DR5-3740	JUNCTION	5.31	5.31	0 12:00	0.0927	0.0927	-0.002
DR5-3746	JUNCTION	3.08	16.06	0 12:01	0.0591	0.334	0.266
DR5-3750	JUNCTION	11.03	11.03	0 12:00	0.226	0.226	-0.045

## Briarfield10yrtwExisting-10yr24hr

DR5-3757	JUNCTION	2.36	13.13	0 12:05	0.0403	0.495	0.083
DR5-3792	JUNCTION	5.58	9.46	0 12:06	0.101	0.357	1.417
DR5-3822	JUNCTION	14.37	25.27	0 12:47	0.306	1.83	0.078
DR5-3826	JUNCTION	2.21	15.65	0 11:53	0.0375	0.707	-0.016
DR5-3844	JUNCTION	4.19	143.76	0 11:58	0.0876	5.58	0.503
DR5-3857	JUNCTION	19.93	19.93	0 12:00	0.438	0.438	0.513
DR5-3859	JUNCTION	2.06	145.51	0 12:00	0.0402	5.52	0.381
DR5-3866	JUNCTION	27.94	43.21	0 12:00	0.587	1.46	0.375
DR5-3874	JUNCTION	0.00	32.72	0 12:00	0	0.796	0.322
DR5-3875	JUNCTION	12.56	33.04	0 12:00	0.246	0.805	0.068
DR5-3879	JUNCTION	0.00	199.77	0 12:01	0	11.9	1.652
DR5-3885	JUNCTION	0.00	178.90	0 12:00	0	12.7	0.862
DR5-3886	JUNCTION	25.57	184.73	0 12:02	0.522	14.3	0.115
DR5-3887	JUNCTION	0.00	175.54	0 12:06	0	12.6	0.629
DR5-3902	JUNCTION	21.82	21.82	0 12:00	0.489	0.489	0.000
DR5-3903	JUNCTION	3.07	108.60	0 11:57	0.0529	6.57	0.081
DR5-3905	JUNCTION	7.70	52.23	0 12:00	0.147	1.1	-0.017
DR5-3911	JUNCTION	4.23	23.07	0 12:00	0.0852	0.463	0.024
DR5-3914	JUNCTION	0.00	3.63	0 12:06	0	0.0473	-1.846
DR5-3916	JUNCTION	17.68	99.05	0 12:05	0.4	6.18	0.108
DR5-3926	JUNCTION	0.00	36.38	0 12:00	0	0.742	-0.687
DR5-3932	JUNCTION	4.46	65.34	0 12:37	0.0837	3.72	0.001
DR5-3934	JUNCTION	5.34	58.91	0 12:26	0.112	2.3	-0.001
DR5-3938	JUNCTION	21.49	21.49	0 12:00	0.471	0.472	-0.011
DR5-3961	JUNCTION	4.55	19.76	0 12:41	0.086	0.984	0.084
DR5-3966	JUNCTION	13.96	60.88	0 11:55	0.295	1.01	0.353
DR5-3968	JUNCTION	16.03	24.75	0 12:05	0.415	0.874	0.134
DR5-3971	JUNCTION	6.30	29.81	0 11:55	0.123	1.25	-0.001
DR5-4196	JUNCTION	10.70	63.18	0 12:00	0.225	2.23	0.828
DR5-4206	JUNCTION	0.30	45.85	0 12:15	0.00598	1.55	-0.003
DR5-4218	JUNCTION	1.88	13.54	0 12:00	0.033	0.284	0.884
DR5-4222	JUNCTION	11.66	11.66	0 12:00	0.251	0.251	0.330
DR5-4224	JUNCTION	1.35	12.25	0 12:02	0.026	0.318	0.883
DR5-4225	JUNCTION	11.51	11.51	0 12:00	0.217	0.22	0.449
DR5-4230	JUNCTION	20.18	20.18	0 12:00	0.433	0.442	0.187
DR5-4236	JUNCTION	5.94	29.57	0 11:57	0.118	0.8	-0.017
DR5-4281	JUNCTION	1.83	21.22	0 12:05	0.0316	0.571	0.394
DR5-4282	JUNCTION	2.77	23.67	0 12:00	0.0537	0.622	0.437
DR5-4293	JUNCTION	1.67	32.27	0 12:36	0.0291	2.1	0.123
DR5-4298	JUNCTION	38.16	48.55	0 12:03	1.01	3.1	0.128
DR5-4302	JUNCTION	13.41	31.38	0 12:06	0.329	1.84	0.000
DR5-4305	JUNCTION	33.39	43.97	0 12:00	0.882	1.51	0.004
DR5-4307	JUNCTION	23.19	23.19	0 12:00	0.482	0.482	-0.001
DR5-4310	JUNCTION	67.01	99.64	0 11:58	1.82	5.78	0.018

## Briarfield10yrtwExisting-10yr24hr

DR5-4311	JUNCTION	1.48	50.38	0 12:03	0.0275	3.76	0.001
DR5-4314	JUNCTION	12.20	110.04	0 12:06	0.246	3.59	-0.002
DR5-4315	JUNCTION	66.53	66.53	0 12:05	2.02	3.76	0.012
DR5-4317	JUNCTION	10.34	68.41	0 11:55	0.226	1.22	0.031
DR5-4323	JUNCTION	1.78	98.09	0 12:08	0.025	3.27	-0.001
DR5-4327	JUNCTION	9.63	19.49	0 11:55	0.218	0.624	0.001
DR5-4328	JUNCTION	18.14	18.14	0 12:00	0.405	0.406	-0.007
DR5-4343	JUNCTION	0.00	25.47	0 12:00	0	0.566	-0.051
DR5-4344	JUNCTION	2.73	27.83	0 12:00	0.0424	0.61	0.041
DR5-4345	JUNCTION	0.00	105.42	0 12:00	0	1.89	9.119
DR5-4351	JUNCTION	2.62	13.65	0 12:00	0.0499	0.235	2.026
DR5-4355	JUNCTION	6.27	6.99	0 11:58	0.119	0.121	0.111
DR5-4356	JUNCTION	2.00	9.70	0 12:00	0.0368	0.159	0.524
DR5-4357	JUNCTION	0.70	10.37	0 12:00	0.0121	0.171	0.359
DR5-4358	JUNCTION	0.80	11.14	0 12:00	0.0142	0.185	1.302
DR5-4360	JUNCTION	6.22	47.88	0 12:00	0.123	1.2	1.501
DR5-4633	JUNCTION	5.13	20.57	0 11:59	0.0898	0.383	0.323
DR5-4634	JUNCTION	5.51	26.05	0 12:00	0.0952	0.477	0.808
DR5-4657	JUNCTION	5.50	26.76	0 12:00	0.109	0.598	0.020
DR5-4658	JUNCTION	21.27	21.27	0 12:00	0.489	0.489	-0.000
DR5-5300	JUNCTION	1.00	6.25	0 12:00	0.0149	0.108	0.001
DR5-5354	JUNCTION	56.25	56.25	0 12:05	1.52	2.37	0.011
DR5-5364	JUNCTION	5.18	5.18	0 12:00	0.1	0.1	0.060
DR5-5365	JUNCTION	3.27	32.34	0 12:22	0.0608	0.604	0.012
DR5-5366	JUNCTION	5.59	30.05	0 12:22	0.107	0.535	-0.022
DR5-5367	JUNCTION	2.42	30.80	0 12:24	0.0442	0.388	-0.020
DR5-5368	JUNCTION	16.13	19.57	0 11:58	0.322	0.325	-0.010
DR5-5388	JUNCTION	2.85	33.38	0 11:57	0.0411	2.07	0.243
MN01	JUNCTION	0.00	76.55	0 12:01	0	4.44	0.017
MN02	JUNCTION	0.00	364.80	0 12:21	0	11.3	0.366
DR5-0506	OUTFALL	0.00	20.32	0 11:59	0	0.632	0.000
DR5-0571	OUTFALL	0.00	142.12	0 12:06	0	6.11	0.000
DR5-0592	OUTFALL	0.00	7.10	0 12:19	0	0.254	0.000
DR5-0608	OUTFALL	0.00	14.59	0 12:10	0	0.634	0.000
DR5-0640	OUTFALL	0.00	36.18	0 12:11	0	0.527	0.000
DR5-0642	OUTFALL	0.00	23.10	0 12:22	0	1.35	0.000
DR5-0729	OUTFALL	0.00	542.59	0 12:17	0	39.4	0.000
DR5-0741	OUTFALL	0.00	23.67	0 12:00	0	0.618	0.000
DR5-0774	OUTFALL	0.00	31.64	0 12:05	0	0.826	0.000
DR5-2238	OUTFALL	0.00	1.80	0 14:35	0	0.577	0.000
DR5-2837	OUTFALL	0.00	10.52	0 12:00	0	0.186	0.000
DR5-2845	OUTFALL	0.00	22.88	0 12:00	0	0.458	0.000
DR5-2847	OUTFALL	0.00	17.07	0 12:00	0	0.333	0.000
DR5-2863	OUTFALL	0.00	26.34	0 12:47	0	3.04	0.000

Briarfield10yrtwExisting-10yr24hr

DR5-3644	OUTFALL	0.00	130.66	0	12:00	0	3.51	0.000
DR5-3725	OUTFALL	0.00	115.08	0	12:06	0	4.43	0.000
DR5-3791	OUTFALL	0.00	7.74	0	12:15	0	0.239	0.000
DR5-3810	OUTFALL	0.00	0.81	0	13:27	0	0.044	0.000
DR5-3810_1	OUTFALL	0.00	12.60	0	12:28	0	0.768	0.000
DR5-3833	OUTFALL	0.00	7.07	0	12:25	0	0.287	0.000
DR5-3842	OUTFALL	0.00	24.02	0	12:09	0	0.676	0.000
DR5-3845	OUTFALL	0.00	1.99	0	13:00	0	0.138	0.000
DR5-3849	OUTFALL	0.00	5.58	0	12:48	0	0.377	0.000
DR5-3856	OUTFALL	0.00	18.20	0	12:04	0	0.381	0.000
DR5-4635	OUTFALL	0.00	19.05	0	12:06	0	0.473	0.000
DR5-4656	OUTFALL	0.00	26.77	0	12:00	0	0.598	0.000
Pond	STORAGE	36.87	89.30	0	12:00	0.76	2.5	1.400

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Node Surcharge Summary

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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Max. Height	Min. Depth	
		Hours Above Crown	Below Rim	
DR5-0474	JUNCTION	2.67	2.865	0.000
DR5-0504	JUNCTION	0.67	3.720	0.080
DR5-0524	JUNCTION	2.39	3.698	0.000
DR5-0572	JUNCTION	30.97	2.203	0.907
DR5-0584	JUNCTION	32.14	2.023	0.000
DR5-0593	JUNCTION	33.31	2.630	0.000
DR5-0599	JUNCTION	31.29	3.080	0.000
DR5-0603	JUNCTION	27.95	2.201	0.000
DR5-0648	JUNCTION	31.43	3.447	0.000
DR5-0661	JUNCTION	1.59	4.141	0.000
DR5-0681	JUNCTION	0.99	3.344	0.000
DR5-0689	JUNCTION	0.30	4.415	0.000
DR5-0690	JUNCTION	0.32	1.463	0.000
DR5-0691	JUNCTION	1.53	1.860	0.000
DR5-0712	JUNCTION	0.32	1.445	0.000
DR5-0714	JUNCTION	0.95	3.478	0.000
DR5-0715	JUNCTION	1.40	2.798	0.000
DR5-0716	JUNCTION	1.40	2.394	0.000
DR5-0718	JUNCTION	1.41	2.614	0.000

## Briarfield10yrtwExisting-10yr24hr

DR5-0724	JUNCTION	33.38	3.155	0.000
DR5-0730	JUNCTION	1.51	0.523	0.000
DR5-0737	JUNCTION	0.34	1.735	0.976
DR5-0738	JUNCTION	33.35	4.462	1.077
DR5-0739	JUNCTION	33.40	4.562	1.153
DR5-0744	JUNCTION	0.36	2.046	0.000
DR5-0751	JUNCTION	1.80	2.086	0.000
DR5-0754	JUNCTION	0.91	3.630	0.000
DR5-0769	JUNCTION	1.10	1.760	0.000
DR5-0772	JUNCTION	0.77	1.600	0.000
DR5-0782	JUNCTION	34.01	5.686	0.000
DR5-0783	JUNCTION	34.60	4.435	0.000
DR5-0790	JUNCTION	1.03	0.727	2.322
DR5-0792	JUNCTION	33.92	5.529	0.000
DR5-0800	JUNCTION	1.34	0.812	1.192
DR5-0808	JUNCTION	0.55	2.707	0.000
DR5-0809	JUNCTION	26.83	1.933	0.000
DR5-0810	JUNCTION	33.63	3.470	0.000
DR5-0818	JUNCTION	0.54	2.298	0.000
DR5-0830	JUNCTION	0.69	0.556	0.000
DR5-0833	JUNCTION	0.54	2.008	0.000
DR5-0841	JUNCTION	0.71	1.325	0.000
DR5-0873	JUNCTION	0.61	3.736	0.614
DR5-0898	JUNCTION	1.48	3.404	0.000
DR5-0907	JUNCTION	0.60	3.695	0.442
DR5-0914	JUNCTION	0.59	3.613	0.457
DR5-0925	JUNCTION	1.50	3.170	0.000
DR5-0947	JUNCTION	0.58	3.395	0.000
DR5-0958	JUNCTION	1.52	3.499	0.000
DR5-0966	JUNCTION	0.57	3.825	0.000
DR5-0973	JUNCTION	0.56	2.889	0.000
DR5-0983	JUNCTION	1.04	3.365	0.000
DR5-0988	JUNCTION	0.56	2.784	0.000
DR5-0991	JUNCTION	1.04	3.320	0.000
DR5-0992	JUNCTION	0.56	2.762	0.000
DR5-1004	JUNCTION	0.60	3.100	0.000
DR5-1005	JUNCTION	0.74	3.932	0.000
DR5-1007	JUNCTION	1.86	1.450	0.000
DR5-1017	JUNCTION	0.66	0.284	1.732
DR5-1028	JUNCTION	0.92	1.087	0.763
DR5-1032	JUNCTION	0.76	1.982	0.000
DR5-1033	JUNCTION	0.72	1.817	0.000
DR5-1034	JUNCTION	0.35	1.714	1.082
DR5-1035	JUNCTION	0.35	1.503	0.000

## Briarfield10yrtwExisting-10yr24hr

DR5-1311	JUNCTION	31.87	1.224	0.376
DR5-1334	JUNCTION	0.29	2.000	0.000
DR5-1350	JUNCTION	30.52	2.967	1.133
DR5-1361	JUNCTION	2.62	4.074	0.000
DR5-1363	JUNCTION	31.41	3.341	1.059
DR5-1371	JUNCTION	0.30	2.470	0.230
DR5-1372	JUNCTION	0.28	2.298	0.602
DR5-1378	JUNCTION	0.39	2.430	0.320
DR5-1391	JUNCTION	2.46	3.745	0.000
DR5-1395	JUNCTION	0.72	3.931	0.569
DR5-1396	JUNCTION	0.39	2.549	0.000
DR5-1404	JUNCTION	0.21	2.955	0.000
DR5-1405	JUNCTION	0.46	3.060	0.190
DR5-1408	JUNCTION	0.39	2.950	0.000
DR5-1409	JUNCTION	0.40	2.950	0.000
DR5-1429	JUNCTION	0.43	3.169	0.031
DR5-1464	JUNCTION	0.47	3.150	0.000
DR5-1493	JUNCTION	0.88	1.629	0.000
DR5-1518	JUNCTION	0.41	2.851	0.000
DR5-1522	JUNCTION	30.38	1.972	0.000
DR5-1530	JUNCTION	32.77	2.600	0.000
DR5-1531	JUNCTION	33.84	3.076	0.000
DR5-1533	JUNCTION	0.31	1.842	0.000
DR5-1554	JUNCTION	1.57	2.985	0.000
DR5-1555	JUNCTION	0.33	2.305	0.000
DR5-1557	JUNCTION	1.51	2.074	0.000
DR5-1591	JUNCTION	1.40	2.528	0.000
DR5-1596	JUNCTION	1.40	2.585	0.000
DR5-1597	JUNCTION	33.27	4.110	0.000
DR5-1607	JUNCTION	0.88	2.364	0.000
DR5-1614	JUNCTION	34.40	4.942	0.000
DR5-1615	JUNCTION	0.30	0.823	0.247
DR5-1623	JUNCTION	33.84	1.209	0.687
DR5-1626	JUNCTION	33.82	1.777	0.582
DR5-1629	JUNCTION	1.02	4.732	0.000
DR5-1632	JUNCTION	0.55	3.300	0.000
DR5-1633	JUNCTION	34.36	3.837	0.000
DR5-1636	JUNCTION	27.57	3.168	0.000
DR5-1637	JUNCTION	33.40	2.995	0.000
DR5-1640	JUNCTION	0.51	2.720	0.000
DR5-1646	JUNCTION	0.67	3.220	0.000
DR5-1647	JUNCTION	0.29	0.225	0.000
DR5-1657	JUNCTION	33.77	5.120	0.000
DR5-1659	JUNCTION	33.75	5.006	0.000

## Briarfield10yrtwExisting-10yr24hr

DR5-1672	JUNCTION	0.57	2.656	0.344
DR5-1689	JUNCTION	0.73	2.398	0.000
DR5-1698	JUNCTION	1.42	1.906	0.394
DR5-1701	JUNCTION	0.58	3.093	0.000
DR5-1704	JUNCTION	0.62	3.727	0.679
DR5-1705	JUNCTION	0.82	1.690	0.000
DR5-1707	JUNCTION	0.97	2.374	0.000
DR5-1732	JUNCTION	1.01	3.654	0.000
DR5-1738	JUNCTION	0.57	3.105	0.000
DR5-1754	JUNCTION	1.01	3.058	0.000
DR5-1757	JUNCTION	1.03	3.280	0.000
DR5-1760	JUNCTION	1.32	6.926	0.000
DR5-1779	JUNCTION	0.60	2.745	0.000
DR5-1780	JUNCTION	0.78	2.119	0.000
DR5-1781	JUNCTION	0.43	0.131	4.155
DR5-1792	JUNCTION	0.10	0.549	0.000
DR5-1796	JUNCTION	0.28	1.504	0.656
DR5-1797	JUNCTION	0.98	2.227	0.000
DR5-1799	JUNCTION	0.99	2.266	0.000
DR5-1802	JUNCTION	0.54	2.015	0.000
DR5-1803	JUNCTION	0.37	1.858	0.650
DR5-1805	JUNCTION	0.35	1.763	1.058
DR5-1809	JUNCTION	0.66	2.310	0.000
DR5-1810	JUNCTION	0.66	2.192	0.000
DR5-1811	JUNCTION	0.60	1.543	0.000
DR5-1812	JUNCTION	1.98	2.949	0.000
DR5-1819	JUNCTION	0.52	2.034	0.000
DR5-1940	JUNCTION	2.50	3.802	0.000
DR5-1943	JUNCTION	13.06	0.074	2.426
DR5-1955	JUNCTION	24.07	2.370	1.960
DR5-2033	JUNCTION	34.29	3.352	0.000
DR5-2087	JUNCTION	0.50	2.006	0.000
DR5-2091	JUNCTION	0.53	2.648	1.152
DR5-2092	JUNCTION	0.41	0.975	0.000
DR5-2096	JUNCTION	0.60	3.237	0.413
DR5-2097	JUNCTION	0.61	3.273	0.427
DR5-2239	JUNCTION	32.33	3.690	0.000
DR5-2240	JUNCTION	24.35	1.966	3.934
DR5-2241	JUNCTION	22.20	2.810	0.000
DR5-2242	JUNCTION	0.18	2.860	0.000
DR5-2262	JUNCTION	0.43	0.521	2.939
DR5-2263	JUNCTION	0.78	0.645	4.167
DR5-2264	JUNCTION	0.95	0.789	4.161
DR5-2864	JUNCTION	34.49	1.762	0.349

## Briarfield10yrtwExisting-10yr24hr

DR5-2879	JUNCTION	24.09	0.545	0.000
DR5-2884	JUNCTION	33.54	4.004	0.000
DR5-2886	JUNCTION	24.27	1.961	0.000
DR5-2887	JUNCTION	33.51	4.275	0.000
DR5-2890	JUNCTION	24.15	1.639	0.000
DR5-2900	JUNCTION	0.47	2.050	0.000
DR5-2905	JUNCTION	0.62	2.579	0.050
DR5-2914	JUNCTION	0.30	1.574	0.000
DR5-2917	JUNCTION	0.27	0.734	0.000
DR5-3028	JUNCTION	0.98	0.571	6.742
DR5-3052	JUNCTION	0.85	1.175	0.394
DR5-3056	JUNCTION	1.28	3.067	0.000
DR5-3058	JUNCTION	0.71	2.483	0.612
DR5-3061	JUNCTION	0.71	1.699	0.331
DR5-3068	JUNCTION	2.39	4.822	0.000
DR5-3069	JUNCTION	1.58	2.617	0.000
DR5-3072	JUNCTION	1.51	1.419	0.000
DR5-3077	JUNCTION	1.94	2.198	0.000
DR5-3080	JUNCTION	1.96	2.442	0.000
DR5-3085	JUNCTION	2.47	3.520	0.000
DR5-3109	JUNCTION	34.38	1.717	3.403
DR5-3123	JUNCTION	33.74	3.812	0.000
DR5-3124	JUNCTION	27.57	2.917	0.000
DR5-3125	JUNCTION	27.03	2.955	0.000
DR5-3127	JUNCTION	26.40	2.791	0.000
DR5-3176	JUNCTION	0.61	3.423	0.000
DR5-3217	JUNCTION	2.40	3.910	0.000
DR5-3218	JUNCTION	0.98	2.795	0.000
DR5-3219	JUNCTION	2.53	4.125	0.000
DR5-3229	JUNCTION	2.54	4.708	0.000
DR5-3651	JUNCTION	31.59	2.082	0.818
DR5-3654	JUNCTION	0.46	1.872	1.178
DR5-3666	JUNCTION	2.67	4.081	0.000
DR5-3672	JUNCTION	2.55	3.609	0.000
DR5-3697	JUNCTION	0.26	0.986	0.000
DR5-3723	JUNCTION	0.33	1.149	1.301
DR5-3724	JUNCTION	0.44	2.873	0.000
DR5-3726	JUNCTION	7.17	1.247	2.862
DR5-3746	JUNCTION	0.29	3.881	0.219
DR5-3750	JUNCTION	0.73	1.342	0.000
DR5-3757	JUNCTION	2.45	3.522	0.000
DR5-3792	JUNCTION	33.10	2.921	0.000
DR5-3822	JUNCTION	1.48	2.644	1.160
DR5-3826	JUNCTION	0.74	1.102	0.000

## Briarfield10yrtwExisting-10yr24hr

DR5-3844	JUNCTION	0.86	3.789	0.000
DR5-3857	JUNCTION	34.29	1.437	0.000
DR5-3859	JUNCTION	0.85	3.823	0.000
DR5-3866	JUNCTION	1.42	1.694	0.454
DR5-3874	JUNCTION	0.25	0.168	0.000
DR5-3879	JUNCTION	29.10	1.374	0.000
DR5-3885	JUNCTION	0.73	0.442	0.287
DR5-3886	JUNCTION	0.68	0.365	0.000
DR5-3887	JUNCTION	0.64	0.326	0.000
DR5-3903	JUNCTION	0.77	2.173	0.000
DR5-3916	JUNCTION	0.96	2.588	0.000
DR5-3932	JUNCTION	1.04	3.500	0.000
DR5-3934	JUNCTION	0.57	2.958	0.000
DR5-3938	JUNCTION	1.51	2.918	0.000
DR5-3961	JUNCTION	0.79	2.130	0.000
DR5-3966	JUNCTION	0.55	2.626	0.000
DR5-3968	JUNCTION	0.95	2.281	0.000
DR5-3971	JUNCTION	1.98	2.814	0.000
DR5-4196	JUNCTION	31.32	3.700	0.750
DR5-4206	JUNCTION	0.44	2.511	0.239
DR5-4218	JUNCTION	27.70	1.571	0.000
DR5-4222	JUNCTION	24.87	1.150	0.000
DR5-4224	JUNCTION	33.28	2.627	0.000
DR5-4225	JUNCTION	24.78	1.483	0.945
DR5-4230	JUNCTION	33.27	2.622	0.000
DR5-4236	JUNCTION	0.33	1.259	0.000
DR5-4281	JUNCTION	33.67	4.324	0.000
DR5-4282	JUNCTION	33.79	4.248	0.267
DR5-4293	JUNCTION	1.48	1.703	1.197
DR5-4298	JUNCTION	1.26	1.475	1.375
DR5-4302	JUNCTION	1.52	2.835	0.000
DR5-4305	JUNCTION	1.54	3.574	0.000
DR5-4307	JUNCTION	0.01	0.282	8.058
DR5-4310	JUNCTION	0.85	3.179	0.000
DR5-4311	JUNCTION	1.16	4.052	0.105
DR5-4315	JUNCTION	2.37	5.619	0.000
DR5-4317	JUNCTION	0.59	2.583	0.000
DR5-4323	JUNCTION	0.20	0.982	0.000
DR5-4327	JUNCTION	0.70	1.654	0.000
DR5-4328	JUNCTION	0.70	1.559	0.000
DR5-4351	JUNCTION	0.19	2.810	0.000
DR5-4355	JUNCTION	0.12	2.207	0.000
DR5-4356	JUNCTION	0.14	3.050	0.000
DR5-4357	JUNCTION	0.16	2.783	0.000

Briarfield10yrtwExisting-10yr24hr

DR5-4358	JUNCTION	0.16	2.920	0.000
DR5-4360	JUNCTION	0.70	3.220	1.877
DR5-4633	JUNCTION	0.18	1.050	0.000
DR5-4634	JUNCTION	33.75	3.509	0.000
DR5-5354	JUNCTION	2.56	3.787	0.000
DR5-5364	JUNCTION	0.51	3.195	0.000
DR5-5365	JUNCTION	0.51	2.548	0.000
DR5-5366	JUNCTION	0.53	1.889	0.000
DR5-5367	JUNCTION	0.53	1.786	0.000
DR5-5368	JUNCTION	0.54	1.975	0.000
DR5-5388	JUNCTION	1.56	2.219	0.000
Pond	STORAGE	23.95	1.032	2.468

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Node Flooding Summary

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Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Total Maximum					
	Maximum Hours	Time of Rate Occurrence	Max Flood Volume	Ponded Depth		
	Flooded	CFS	days	hr:min	10^6 gal	Feet
DR5-0474	2.60	12.58	0	12:00	0.137	1.815
DR5-0524	1.73	10.86	0	12:00	0.054	0.648
DR5-0584	24.75	8.66	0	11:56	0.071	0.923
DR5-0593	24.21	7.28	0	12:04	0.048	0.630
DR5-0599	0.01	2.38	0	12:31	0.000	0.000
DR5-0603	27.70	11.51	0	12:00	0.156	1.708
DR5-0648	0.64	42.51	0	11:56	0.091	1.150
DR5-0661	1.52	33.75	0	12:00	0.195	2.591
DR5-0681	0.47	14.69	0	12:31	0.037	0.454
DR5-0689	0.01	7.91	0	11:56	0.000	0.000
DR5-0690	0.19	13.59	0	11:56	0.002	0.023
DR5-0691	0.77	13.03	0	12:05	0.032	0.410
DR5-0712	0.31	5.17	0	12:00	0.016	0.215
DR5-0714	0.40	11.26	0	12:01	0.027	0.334
DR5-0715	0.01	0.82	0	13:09	0.000	0.000
DR5-0716	0.95	7.82	0	12:06	0.040	0.534
DR5-0718	1.37	20.34	0	11:58	0.090	1.193
DR5-0724	4.01	13.18	0	11:52	0.188	1.505
DR5-0730	1.51	23.72	0	12:00	0.122	0.523

## Briarfield10yrtwExisting-10yr24hr

DR5-0744	0.32	6.45	0 12:00	0.019	0.253
DR5-0751	1.17	13.79	0 12:00	0.087	1.086
DR5-0754	0.22	6.12	0 12:05	0.009	0.113
DR5-0769	0.29	6.71	0 12:59	0.005	0.060
DR5-0772	0.01	3.60	0 12:41	0.000	0.000
DR5-0782	33.63	5.30	0 11:58	0.222	2.946
DR5-0783	34.59	17.92	0 12:00	0.297	3.935
DR5-0792	27.20	5.32	0 11:57	0.124	1.638
DR5-0808	0.22	6.82	0 12:06	0.009	0.112
DR5-0809	25.32	15.26	0 12:00	0.128	1.705
DR5-0810	26.99	14.60	0 12:00	0.145	1.920
DR5-0818	0.54	15.64	0 12:00	0.055	0.732
DR5-0830	0.69	35.70	0 12:01	0.099	0.556
DR5-0833	0.15	7.41	0 11:54	0.001	0.007
DR5-0841	0.68	9.92	0 12:00	0.046	0.596
DR5-0898	0.80	11.54	0 12:02	0.047	0.540
DR5-0925	0.84	12.92	0 12:05	0.052	0.643
DR5-0947	0.01	5.02	0 11:55	0.000	0.001
DR5-0958	0.01	2.98	0 11:49	0.000	0.000
DR5-0966	0.01	4.34	0 11:55	0.000	0.000
DR5-0973	0.37	23.13	0 11:54	0.019	0.245
DR5-0983	0.43	10.31	0 12:40	0.019	0.251
DR5-0988	0.41	31.05	0 11:54	0.024	0.304
DR5-0991	0.47	10.71	0 12:40	0.026	0.340
DR5-0992	0.01	38.21	0 11:55	0.000	0.002
DR5-1004	0.48	30.43	0 11:55	0.035	0.423
DR5-1005	0.50	12.92	0 11:55	0.034	0.432
DR5-1007	1.07	24.02	0 12:05	0.050	0.646
DR5-1032	0.11	8.97	0 12:31	0.004	0.003
DR5-1033	0.10	11.52	0 11:53	0.005	0.003
DR5-1035	0.35	28.70	0 12:00	0.089	1.173
DR5-1334	0.01	0.15	0 12:01	0.000	0.000
DR5-1361	2.46	23.94	0 12:00	0.184	2.424
DR5-1391	1.61	8.04	0 12:06	0.060	0.755
DR5-1396	0.30	3.78	0 12:00	0.012	0.159
DR5-1404	0.05	1.04	0 12:00	0.000	0.005
DR5-1408	0.01	0.22	0 12:01	0.000	0.000
DR5-1409	0.01	2.53	0 11:54	0.000	0.000
DR5-1464	0.01	6.10	0 11:54	0.000	0.000
DR5-1493	0.84	14.82	0 11:59	0.063	0.829
DR5-1518	0.01	11.03	0 11:55	0.000	0.001
DR5-1522	0.46	4.56	0 12:05	0.013	0.172
DR5-1530	0.03	0.14	0 12:26	0.000	0.000
DR5-1531	32.52	6.58	0 11:58	0.077	0.976

## Briarfield10yrtwExisting-10yr24hr

DR5-1533	0.01	7.87	0 11:56	0.000	0.002
DR5-1554	1.35	16.16	0 12:03	0.108	1.435
DR5-1555	0.02	16.15	0 11:56	0.001	0.005
DR5-1557	1.41	15.93	0 12:02	0.108	1.424
DR5-1591	1.39	18.43	0 11:58	0.095	1.258
DR5-1596	1.05	13.69	0 12:01	0.056	0.735
DR5-1597	0.32	8.08	0 12:00	0.023	0.310
DR5-1607	0.76	21.10	0 12:00	0.095	1.264
DR5-1614	34.21	16.44	0 12:00	0.308	4.065
DR5-1629	0.51	21.80	0 11:57	0.064	0.840
DR5-1632	0.01	6.76	0 12:25	0.000	0.000
DR5-1633	34.30	12.52	0 12:00	0.231	3.066
DR5-1636	25.85	19.91	0 12:00	0.201	2.663
DR5-1637	28.63	13.62	0 12:00	0.187	2.488
DR5-1640	0.01	1.17	0 11:54	0.000	0.000
DR5-1646	0.20	7.27	0 12:03	0.010	0.128
DR5-1647	0.29	11.00	0 11:59	0.018	0.225
DR5-1657	24.02	5.22	0 12:06	0.054	0.707
DR5-1659	24.05	5.92	0 12:06	0.055	0.731
DR5-1689	0.69	17.25	0 12:00	0.072	0.948
DR5-1701	0.01	0.44	0 12:09	0.000	0.000
DR5-1705	0.01	0.57	0 12:37	0.000	0.000
DR5-1707	0.64	13.28	0 12:02	0.052	0.684
DR5-1732	0.72	24.07	0 11:56	0.092	1.195
DR5-1738	0.12	4.66	0 11:54	0.003	0.041
DR5-1754	0.70	14.75	0 12:04	0.066	0.868
DR5-1757	0.75	14.74	0 12:03	0.076	0.980
DR5-1760	1.23	52.13	0 12:00	0.341	4.526
DR5-1779	0.55	34.32	0 11:55	0.044	0.541
DR5-1780	0.55	8.61	0 12:33	0.019	0.109
DR5-1792	0.01	2.12	0 12:08	0.000	0.000
DR5-1797	0.97	18.31	0 12:00	0.087	1.142
DR5-1799	0.98	17.34	0 11:59	0.094	1.241
DR5-1802	0.45	67.23	0 11:56	0.031	0.055
DR5-1809	0.65	14.73	0 11:58	0.052	0.693
DR5-1810	0.66	14.09	0 11:59	0.052	0.692
DR5-1811	0.59	48.41	0 11:56	0.056	0.688
DR5-1812	1.48	20.98	0 12:00	0.102	1.359
DR5-1819	0.48	15.90	0 11:57	0.009	0.034
DR5-1940	1.13	3.96	0 12:19	0.028	0.372
DR5-2033	0.04	0.61	0 12:00	0.000	0.002
DR5-2087	0.21	3.73	0 11:54	0.003	0.036
DR5-2092	0.20	5.63	0 11:54	0.006	0.065
DR5-2239	24.24	10.62	0 12:06	0.146	1.825

## Briarfield10yrtwExisting-10yr24hr

DR5-2241	0.01	0.66	0 11:57	0.000	0.000
DR5-2242	0.01	0.29	0 11:57	0.000	0.000
DR5-2879	24.09	13.99	0 12:06	0.086	0.545
DR5-2884	29.40	9.96	0 12:00	0.148	1.941
DR5-2886	0.42	9.49	0 11:58	0.035	0.447
DR5-2887	1.36	19.86	0 12:00	0.098	1.275
DR5-2890	0.29	6.38	0 12:14	0.011	0.126
DR5-2900	0.01	2.79	0 12:19	0.000	0.000
DR5-2914	0.29	5.16	0 12:00	0.013	0.164
DR5-2917	0.26	2.41	0 11:55	0.005	0.059
DR5-3056	1.24	31.85	0 12:00	0.155	2.033
DR5-3068	1.06	23.14	0 11:59	0.097	1.255
DR5-3069	1.57	20.50	0 11:56	0.157	2.074
DR5-3072	0.75	8.00	0 12:00	0.028	0.364
DR5-3077	1.53	7.59	0 12:00	0.052	0.665
DR5-3080	1.87	14.57	0 11:56	0.109	1.422
DR5-3085	1.98	10.01	0 12:00	0.106	1.390
DR5-3123	33.51	4.39	0 12:00	0.139	1.812
DR5-3124	24.14	7.57	0 12:05	0.054	0.667
DR5-3125	24.41	10.65	0 11:56	0.100	1.305
DR5-3127	24.90	15.80	0 11:55	0.136	1.747
DR5-3176	0.01	6.45	0 11:55	0.000	0.002
DR5-3217	1.85	13.03	0 12:05	0.089	1.085
DR5-3218	0.97	14.06	0 12:00	0.063	0.812
DR5-3219	1.74	13.05	0 12:06	0.077	1.024
DR5-3229	2.49	39.79	0 12:00	0.255	3.388
DR5-3666	1.54	8.83	0 12:06	0.051	0.681
DR5-3672	2.06	22.57	0 12:00	0.132	1.759
DR5-3697	0.25	2.62	0 12:00	0.007	0.086
DR5-3724	0.32	3.06	0 12:00	0.009	0.123
DR5-3750	0.72	8.03	0 12:00	0.038	0.500
DR5-3757	1.50	6.09	0 12:06	0.042	0.522
DR5-3792	32.05	8.69	0 12:00	0.127	1.662
DR5-3826	0.09	0.13	0 12:07	0.000	0.002
DR5-3844	0.45	20.36	0 11:58	0.043	0.548
DR5-3857	34.28	3.96	0 11:58	0.073	0.931
DR5-3859	0.34	17.46	0 11:59	0.027	0.343
DR5-3874	0.25	7.54	0 12:00	0.013	0.168
DR5-3879	29.10	24.17	0 11:47	0.931	1.374
DR5-3886	0.68	12.28	0 12:01	0.029	0.365
DR5-3887	0.64	16.03	0 12:06	0.047	0.326
DR5-3903	0.01	1.73	0 12:37	0.000	0.000
DR5-3916	0.12	1.87	0 11:51	0.002	0.020
DR5-3932	0.01	3.56	0 12:40	0.000	0.000

Briarfield10yrtwExisting-10yr24hr

DR5-3934	0.30	7.80	0	11:55	0.015	0.190
DR5-3938	1.51	19.01	0	12:05	0.127	1.668
DR5-3961	0.07	7.10	0	12:34	0.001	0.001
DR5-3966	0.30	59.82	0	11:55	0.030	0.039
DR5-3968	0.92	10.02	0	12:06	0.043	0.510
DR5-3971	1.98	19.78	0	11:55	0.176	2.329
DR5-4218	0.81	5.09	0	12:00	0.021	0.271
DR5-4222	0.01	1.08	0	12:40	0.000	0.000
DR5-4224	24.25	7.81	0	12:00	0.061	0.801
DR5-4230	33.26	9.90	0	12:00	0.178	2.372
DR5-4236	0.03	19.28	0	11:56	0.001	0.009
DR5-4302	1.47	29.76	0	11:59	0.163	2.148
DR5-4305	1.53	28.87	0	12:00	0.182	2.414
DR5-4310	0.67	21.66	0	11:58	0.082	0.989
DR5-4315	0.42	14.50	0	12:05	0.039	0.519
DR5-4317	0.55	65.60	0	11:55	0.051	0.575
DR5-4323	0.01	0.64	0	12:08	0.000	0.000
DR5-4327	0.70	10.23	0	11:56	0.052	0.683
DR5-4328	0.60	10.00	0	12:00	0.040	0.519
DR5-4351	0.01	0.45	0	11:59	0.000	0.000
DR5-4355	0.04	5.58	0	11:58	0.001	0.007
DR5-4356	0.01	3.74	0	11:58	0.000	0.000
DR5-4357	0.02	4.59	0	11:58	0.000	0.003
DR5-4358	0.01	0.63	0	11:58	0.000	0.000
DR5-4633	0.01	0.97	0	12:01	0.000	0.000
DR5-4634	0.37	9.64	0	11:59	0.031	0.409
DR5-5354	2.48	23.91	0	11:58	0.190	2.537
DR5-5365	0.01	2.83	0	11:55	0.000	0.000
DR5-5366	0.45	18.87	0	11:57	0.049	0.637
DR5-5367	0.43	18.32	0	12:01	0.041	0.537
DR5-5368	0.53	19.57	0	11:58	0.062	0.824
DR5-5388	1.52	26.27	0	12:00	0.124	1.620

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Storage Volume Summary

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Storage Unit	Average Volume 1000 ft3	Avg Pcnt	Evap Loss	Infil Loss	Maximum Volume 1000 ft3	Max Pcnt	Time of Max Occurrence	Maximum Outflow CFS
Pond	196.257	43	0	0	252.131	56	0 14:35	32.35

Briarfield10yrtwExisting-10yr24hr

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Outfall Loading Summary

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Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CFS	CFS	10^6 gal
DR5-0506	97.34	0.82	20.32	0.632
DR5-0571	85.86	9.17	142.12	6.106
DR5-0592	50.28	0.66	7.10	0.254
DR5-0608	67.97	1.23	14.59	0.634
DR5-0640	49.69	1.27	36.18	0.527
DR5-0642	90.65	1.96	23.10	1.347
DR5-0729	81.99	63.61	542.59	39.398
DR5-0741	75.54	1.04	23.67	0.618
DR5-0774	73.59	1.41	31.64	0.826
DR5-2238	58.11	1.01	1.80	0.577
DR5-2837	71.62	0.33	10.52	0.186
DR5-2845	81.83	0.71	22.88	0.458
DR5-2847	79.31	0.54	17.07	0.333
DR5-2863	96.14	4.12	26.34	3.042
DR5-3644	83.19	5.36	130.66	3.512
DR5-3725	86.28	6.59	115.08	4.427
DR5-3791	46.97	0.66	7.74	0.239
DR5-3810	37.29	0.13	0.81	0.044
DR5-3810_1	62.89	1.65	12.60	0.768
DR5-3833	53.81	0.68	7.07	0.287
DR5-3842	64.34	1.34	24.02	0.676
DR5-3845	47.83	0.34	1.99	0.138
DR5-3849	54.15	0.91	5.58	0.377
DR5-3856	62.53	0.78	18.20	0.381
DR5-4635	71.55	0.83	19.05	0.473
DR5-4656	90.45	0.84	26.77	0.598
System	70.05	108.01	1166.02	66.859

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Link Flow Summary

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## Briarfield10yrtwExisting-10yr24hr

Link	Type	CFS	Maximum	Time of Max	Max	Maximum	Max/	Max/
			Flow	Occurrence	Veloc	Full	Flow	Depth
DR5-0281	CONDUIT	17.45	0	12:07	5.55	1.26	1.00	
DR5-0308	CONDUIT	33.15	0	12:00	2.54	0.29	0.71	
DR5-0380	CONDUIT	33.08	0	12:01	1.03	0.13	0.60	
DR5-0711	CONDUIT	47.89	0	12:00	4.98	1.06	1.00	
DR5-0713	CONDUIT	32.17	0	12:36	4.55	1.07	1.00	
DR5-0715.1	CONDUIT	22.08	0	12:13	4.50	0.59	1.00	
DR5-0789	CONDUIT	26.77	0	12:00	7.85	0.54	0.80	
DR5-0794.1	CONDUIT	21.30	0	12:00	10.73	0.59	0.62	
DR5-0800.1	CONDUIT	130.66	0	12:00	8.22	1.20	1.00	
DR5-0827	CONDUIT	31.51	0	12:00	6.42	1.05	1.00	
DR5-0830.1	CONDUIT	99.06	0	12:06	7.88	1.45	1.00	
DR5-0832	CONDUIT	70.14	0	12:09	5.70	1.06	1.00	
DR5-0836	CONDUIT	17.76	0	11:59	10.05	1.07	1.00	
DR5-0851	CONDUIT	29.44	0	12:01	9.37	2.88	1.00	
DR5-0863.1	CONDUIT	50.94	0	12:00	5.29	0.85	1.00	
DR5-0881	CONDUIT	16.06	0	12:01	5.11	0.99	1.00	
DR5-0882	CONDUIT	29.45	0	12:00	6.00	0.71	1.00	
DR5-0886	CONDUIT	7.74	0	12:15	2.46	0.50	1.00	
DR5-0894	CONDUIT	45.80	0	12:15	6.94	1.01	1.00	
DR5-0922	CONDUIT	33.64	0	11:58	4.76	1.55	1.00	
DR5-0925.1	CONDUIT	10.32	0	12:25	3.28	0.88	1.00	
DR5-0932.1	CONDUIT	10.61	0	12:25	3.38	0.38	1.00	
DR5-0934	CONDUIT	6.73	0	12:14	2.14	1.01	1.00	
DR5-0941	CONDUIT	11.04	0	12:02	3.52	1.65	1.00	
DR5-0946	CONDUIT	29.79	0	11:58	5.93	3.83	1.00	
DR5-0959	CONDUIT	28.05	0	12:11	5.71	0.43	1.00	
DR5-0960	CONDUIT	25.94	0	12:13	5.29	1.13	1.00	
DR5-0966.1	CONDUIT	138.00	0	12:13	9.01	2.14	1.00	
DR5-0973.1	CONDUIT	24.08	0	11:57	4.90	1.13	1.00	
DR5-0979	CONDUIT	24.28	0	12:47	4.95	1.15	1.00	
DR5-0985	CONDUIT	32.00	0	11:55	6.52	0.88	1.00	
DR5-0987	CONDUIT	17.43	0	12:07	5.55	1.56	1.00	
DR5-1000	CONDUIT	145.00	0	11:56	9.46	2.25	1.00	
DR5-1012.1	CONDUIT	10.27	0	11:56	3.27	1.53	1.00	
DR5-1013	CONDUIT	23.10	0	11:56	5.41	0.77	1.00	
DR5-1014	CONDUIT	24.83	0	12:47	3.51	0.73	1.00	
DR5-1016	CONDUIT	23.70	0	11:58	4.24	0.87	1.00	
DR5-1032.1	CONDUIT	12.31	0	11:57	3.92	0.61	1.00	

## Briarfield10yrtwExisting-10yr24hr

DR5-1034.1	CONDUIT	21.07	0 11:50	4.54	0.76	0.63
DR5-1041	CONDUIT	21.65	0 11:56	6.97	1.31	1.00
DR5-1044	CONDUIT	143.05	0 11:59	6.02	1.39	1.00
DR5-1045	CONDUIT	15.50	0 13:09	4.93	1.58	1.00
DR5-1046	CONDUIT	20.72	0 12:17	7.04	2.08	0.91
DR5-1048	CONDUIT	20.44	0 12:23	6.51	2.05	1.00
DR5-1049	CONDUIT	17.13	0 12:15	5.45	4.79	1.00
DR5-1050	CONDUIT	26.98	0 12:06	8.59	2.72	1.00
DR5-1051	CONDUIT	15.88	0 13:09	5.05	1.59	1.00
DR5-1058	CONDUIT	23.10	0 12:22	4.71	1.19	1.00
DR5-1067	CONDUIT	97.61	0 12:08	6.14	1.79	1.00
DR5-1069	CONDUIT	18.06	0 12:40	7.51	1.87	1.00
DR5-1070	CONDUIT	36.57	0 12:40	7.49	1.78	1.00
DR5-1088	CONDUIT	23.67	0 12:00	7.53	1.52	1.00
DR5-1091	CONDUIT	16.67	0 12:15	5.31	0.90	1.00
DR5-1094	CONDUIT	8.51	0 11:56	2.71	0.62	1.00
DR5-1098	CONDUIT	32.29	0 12:36	4.57	0.66	1.00
DR5-1101	CONDUIT	8.71	0 11:57	2.77	0.65	1.00
DR5-1104	CONDUIT	97.78	0 11:57	13.83	3.54	1.00
DR5-1111	CONDUIT	67.37	0 12:09	5.68	1.01	1.00
DR5-1119	CONDUIT	64.66	0 12:37	6.72	1.46	1.00
DR5-1120	CONDUIT	45.19	0 12:29	4.70	1.14	1.00
DR5-1121	CONDUIT	20.17	0 12:52	6.42	1.60	1.00
DR5-1127	CONDUIT	14.82	0 12:13	4.72	1.02	1.00
DR5-1137	CONDUIT	7.07	0 12:25	2.25	0.33	1.00
DR5-1146	CONDUIT	31.64	0 12:05	4.48	0.38	1.00
DR5-1149	CONDUIT	139.79	0 11:58	5.88	1.36	1.00
DR5-1155	CONDUIT	8.83	0 12:01	2.81	0.30	1.00
DR5-1164	CONDUIT	126.46	0 11:59	5.32	0.52	1.00
DR5-1176	CONDUIT	21.59	0 12:00	7.04	0.92	0.76
DR5-1181	CONDUIT	8.62	0 11:54	2.74	0.66	1.00
DR5-1187	CONDUIT	9.19	0 12:00	8.12	0.45	0.41
DR5-1196	CONDUIT	52.16	0 12:00	7.03	0.53	0.65
DR5-1197	CONDUIT	21.80	0 12:00	4.50	0.62	0.81
DR5-1201	CONDUIT	22.91	0 12:00	5.22	0.41	0.75
DR5-1205	CONDUIT	16.59	0 12:00	5.92	0.71	0.66
DR5-1208	CONDUIT	17.29	0 12:00	4.69	0.72	0.57
DR5-1212	CONDUIT	3.23	0 12:00	4.59	0.17	0.34
DR5-1213	CONDUIT	21.14	0 12:00	6.12	0.65	0.66
DR5-1217	CONDUIT	28.16	0 13:17	10.67	2.50	1.00
DR5-1218	CONDUIT	59.59	0 12:26	4.84	1.10	1.00
DR5-1228	CONDUIT	65.05	0 12:37	6.76	1.47	1.00
DR5-1233	CONDUIT	56.68	0 12:26	4.55	1.04	1.00
DR5-1236	CONDUIT	107.93	0 12:00	18.02	2.78	0.84

## Briarfield10yrtwExisting-10yr24hr

DR5-1240	CONDUIT	19.93	0	12:41	3.91	0.91	1.00
DR5-1244	CONDUIT	39.19	0	12:08	3.99	0.95	1.00
DR5-1253	CONDUIT	19.52	0	12:53	6.21	1.55	1.00
DR5-1255	CONDUIT	19.61	0	12:09	6.24	3.23	1.00
DR5-1304	CONDUIT	17.95	0	13:53	5.71	1.63	1.00
DR5-1305	CONDUIT	17.96	0	13:53	5.72	2.98	1.00
DR5-1307	CONDUIT	11.88	0	12:08	6.30	0.16	1.00
DR5-1314	CONDUIT	20.97	0	11:55	6.67	0.25	1.00
DR5-1414	CONDUIT	48.53	0	12:03	6.87	1.69	1.00
DR5-1584	CONDUIT	10.52	0	12:00	3.35	0.29	1.00
DR5-1591.1	CONDUIT	17.07	0	12:00	6.90	0.41	0.74
DR5-1600	CONDUIT	26.34	0	12:47	6.03	1.11	1.00
DR5-1603	CONDUIT	16.57	0	11:55	5.27	1.57	1.00
DR5-1606	CONDUIT	26.82	0	12:02	5.46	0.74	1.00
DR5-1609	CONDUIT	26.26	0	12:47	8.36	1.36	1.00
DR5-1616	CONDUIT	27.32	0	12:15	8.69	0.83	1.00
DR5-1619	CONDUIT	12.61	0	11:45	4.01	0.67	1.00
DR5-1634	CONDUIT	10.44	0	11:53	3.32	1.08	1.00
DR5-1637.1	CONDUIT	62.73	0	12:13	5.56	0.42	0.61
DR5-1670	CONDUIT	30.39	0	11:58	4.89	0.43	1.00
DR5-1672.1	CONDUIT	11.67	0	12:00	3.71	0.49	1.00
DR5-1692	CONDUIT	153.59	0	12:32	4.24	0.70	1.00
DR5-1694.1	CONDUIT	24.02	0	12:09	7.65	1.23	1.00
DR5-1703	CONDUIT	11.48	0	12:10	3.65	0.85	1.00
DR5-1706	CONDUIT	111.79	0	11:59	5.69	0.59	1.00
DR5-1710	CONDUIT	16.54	0	12:26	5.26	1.26	1.00
DR5-1712	CONDUIT	17.80	0	12:06	5.67	1.66	1.00
DR5-1715	CONDUIT	56.43	0	11:59	5.11	0.74	0.98
DR5-1724	CONDUIT	84.51	0	12:09	6.72	1.24	1.00
DR5-1727	CONDUIT	70.63	0	12:00	5.74	1.05	1.00
DR5-1732.1	CONDUIT	12.31	0	11:50	3.92	1.23	1.00
DR5-1736	CONDUIT	26.84	0	12:00	7.21	0.82	0.91
DR5-1742	CONDUIT	65.30	0	12:37	6.79	1.47	1.00
DR5-1743	CONDUIT	58.90	0	12:26	4.76	1.08	1.00
DR5-1745	CONDUIT	12.22	0	11:55	5.53	0.47	1.00
DR5-1747	CONDUIT	11.64	0	12:00	8.41	0.56	0.45
DR5-1755	CONDUIT	57.33	0	12:26	4.61	1.06	1.00
DR5-1758	CONDUIT	23.25	0	11:55	7.40	0.68	1.00
DR5-1759	CONDUIT	62.61	0	12:39	6.51	1.14	1.00
DR5-1762	CONDUIT	35.15	0	12:40	11.19	6.10	1.00
DR5-1764	CONDUIT	171.88	0	12:04	13.20	2.39	0.68
DR5-1772	CONDUIT	49.24	0	12:03	15.67	4.27	1.00
DR5-1778	CONDUIT	17.93	0	12:10	5.71	1.24	1.00
DR5-1781.1	CONDUIT	97.87	0	12:08	6.17	1.80	1.00

## Briarfield10yrtwExisting-10yr24hr

DR5-1786	CONDUIT	40.04	0	12:50	8.16	2.97	1.00
DR5-1787.1	CONDUIT	21.90	0	11:57	4.46	1.62	1.00
DR5-1791	CONDUIT	11.79	0	11:52	3.75	1.58	1.00
DR5-1793	CONDUIT	32.81	0	12:35	10.44	2.04	1.00
DR5-1794	CONDUIT	36.50	0	12:32	11.62	2.27	1.00
DR5-1795.1	CONDUIT	43.50	0	12:29	6.15	1.18	1.00
DR5-1796.1	CONDUIT	18.77	0	13:28	5.98	1.49	1.00
DR5-1835	CONDUIT	32.55	0	12:00	2.56	0.23	0.97
DR5-1838	CONDUIT	25.45	0	12:01	4.09	0.09	0.58
DR5-1839	CONDUIT	6.66	0	12:00	7.81	0.16	0.41
DR5-1840	CONDUIT	19.16	0	12:01	11.15	0.87	0.54
DR5-1868	CONDUIT	8.17	0	12:06	2.60	0.49	1.00
DR5-1871	CONDUIT	52.46	0	12:00	7.94	1.43	1.00
DR5-1872	CONDUIT	46.18	0	12:00	6.53	1.21	1.00
DR5-1998	CONDUIT	15.55	0	11:59	4.95	0.56	1.00
DR5-1999	CONDUIT	19.05	0	12:06	6.06	1.00	1.00
DR5-2129	CONDUIT	19.43	0	12:00	6.39	0.83	0.72
DR5-2241.1	CONDUIT	28.44	0	11:59	1.94	0.32	1.00
DR5-2242.1	CONDUIT	29.32	0	12:05	1.69	0.33	1.00
DR5-2288	CONDUIT	93.45	0	12:02	6.69	0.68	0.92
DR5-2289	CONDUIT	1.99	0	13:00	0.63	0.07	1.00
DR5-2303	CONDUIT	3.49	0	12:19	3.14	0.15	1.00
DR5-2308	CONDUIT	78.54	0	11:59	6.25	1.18	1.00
DR5-2309	CONDUIT	105.80	0	11:57	8.42	2.00	1.00
DR5-2313	CONDUIT	9.02	0	11:50	2.87	0.90	1.00
DR5-2328	CONDUIT	7.78	0	12:00	3.48	0.58	1.00
DR5-2331	CONDUIT	1.80	0	14:35	0.57	0.11	1.00
DR5-2370	CONDUIT	49.98	0	11:58	10.18	2.86	1.00
DR5-2378	CONDUIT	27.90	0	12:00	3.95	0.57	1.00
DR5-2404	CONDUIT	20.87	0	11:53	4.25	0.99	1.00
DR5-2430	CONDUIT	7.10	0	12:06	2.26	0.33	1.00
DR5-2447	CONDUIT	84.70	0	12:35	8.80	1.92	1.00
DR5-2512	CONDUIT	28.73	0	12:05	1.80	0.33	1.00
DR5-2513	CONDUIT	32.90	0	12:00	6.70	1.05	1.00
DR5-2531	CONDUIT	13.33	0	12:01	4.24	0.48	1.00
DR5-2534	CONDUIT	43.21	0	12:00	8.80	2.23	1.00
DR5-2563	CONDUIT	36.59	0	12:42	7.45	2.71	1.00
DR5-2572	CONDUIT	7.10	0	12:19	2.26	0.39	1.00
DR5-2691	CONDUIT	36.58	0	12:01	3.32	0.26	0.92
DR5-2710	CONDUIT	5.26	0	12:00	6.39	0.83	0.54
DR5-2727	CONDUIT	15.01	0	12:08	4.78	1.12	1.00
DR5-2736	CONDUIT	55.51	0	12:26	5.77	1.39	1.00
DR5-2737	CONDUIT	48.66	0	11:56	5.06	1.22	1.00
DR5-2744	CONDUIT	20.57	0	11:59	6.55	0.60	1.00

## Briarfield10yrtwExisting-10yr24hr

DR5-2746	CONDUIT	63.18	0 11:59	6.57	1.50	1.00
DR5-2747	CONDUIT	12.59	0 12:11	7.13	1.57	1.00
DR5-2792	CONDUIT	58.21	0 12:26	4.69	1.07	1.00
DR5-2801	CONDUIT	44.28	0 12:00	6.27	1.41	1.00
DR5-2804	CONDUIT	11.54	0 11:59	3.67	0.92	1.00
DR5-2834	CONDUIT	64.83	0 12:37	6.74	1.47	1.00
DR5-2837.1	CONDUIT	9.70	0 12:00	3.91	0.73	1.00
DR5-2839	CONDUIT	53.56	0 12:07	5.57	1.07	1.00
DR5-2871	CONDUIT	41.23	0 12:13	8.40	1.60	1.00
DR5-2880	CONDUIT	542.59	0 12:17	13.87	5.97	0.98
DR5-2884.1	CONDUIT	17.37	0 13:37	5.53	1.53	1.00
DR5-2885	CONDUIT	20.66	0 13:19	6.57	1.82	1.00
DR5-2886.1	CONDUIT	20.45	0 13:19	6.51	1.81	1.00
DR5-2961	CONDUIT	12.73	0 11:55	4.05	0.88	1.00
DR5-2962	CONDUIT	9.90	0 12:06	4.33	0.76	0.69
DR5-2968	CONDUIT	77.87	0 12:11	6.42	0.62	0.94
DR5-2976	CONDUIT	18.11	0 12:00	9.69	0.70	0.58
DR5-3011	CONDUIT	18.90	0 12:21	6.02	1.57	1.00
DR5-3017	CONDUIT	139.16	0 12:01	5.86	1.36	1.00
DR5-3129	CONDUIT	142.12	0 12:06	5.98	0.67	1.00
DR5-3144	CONDUIT	29.29	0 12:07	9.32	1.05	1.00
DR5-3162	CONDUIT	49.19	0 11:57	5.67	1.41	0.96
DR5-3172	CONDUIT	21.22	0 12:05	6.76	1.36	1.00
DR5-3175	CONDUIT	53.28	0 12:26	5.54	1.34	1.00
DR5-3179	CONDUIT	30.55	0 12:05	9.73	0.57	1.00
DR5-3255	CONDUIT	10.37	0 12:00	3.92	0.71	1.00
DR5-3256	CONDUIT	11.13	0 12:00	3.54	1.01	1.00
DR5-3339	CONDUIT	9.34	0 12:11	7.61	0.64	1.00
DR5-3373	CONDUIT	23.10	0 12:07	7.35	4.84	1.00
DR5-3405	CONDUIT	13.09	0 12:00	6.70	0.33	0.42
DR5-3448	CONDUIT	18.20	0 12:04	3.71	0.20	1.00
DR5-3450	CONDUIT	5.58	0 12:48	1.78	0.49	1.00
DR5-3451	CONDUIT	27.77	0 12:10	5.66	0.55	1.00
DR5-3456	CONDUIT	34.50	0 12:44	7.03	1.34	1.00
DR5-3508	CONDUIT	26.81	0 12:00	5.46	0.97	1.00
DR5-3703	CONDUIT	22.88	0 12:00	7.90	1.15	0.87
DR5-3733	CONDUIT	125.36	0 12:00	7.88	1.44	1.00
DR5-3754	CONDUIT	115.08	0 12:06	7.81	1.06	1.00
DR5-3757.1	CONDUIT	41.72	0 12:00	4.34	0.93	1.00
DR5-3759	CONDUIT	50.60	0 12:10	5.26	0.53	1.00
DR5-3775	CONDUIT	5.97	0 12:15	1.90	0.39	1.00
DR5-3777	CONDUIT	11.08	0 12:06	3.53	2.89	1.00
DR5-3792.1	CONDUIT	14.59	0 12:10	4.64	0.60	1.00
DR5-3793	CONDUIT	11.51	0 12:00	3.66	0.48	1.00

## Briarfield10yrtwExisting-10yr24hr

DR5-3795	CONDUIT	12.60	0	12:28	4.01	2.69	1.00
DR5-3820	CONDUIT	18.04	0	11:56	5.74	0.95	1.00
DR5-3824	CONDUIT	16.81	0	12:13	5.35	1.08	1.00
DR5-3834.1	CONDUIT	15.56	0	12:01	4.43	0.66	0.67
DR5-3839	CONDUIT	38.32	0	12:24	5.42	0.53	1.00
DR5-3842.1	CONDUIT	28.85	0	12:25	6.91	0.47	1.00
DR5-3847	CONDUIT	18.87	0	12:00	6.42	0.34	0.53
DR5-3851	CONDUIT	28.82	0	12:00	4.59	0.26	1.00
DR5-3854	CONDUIT	178.90	0	12:00	9.13	0.83	1.00
DR5-3866.1	CONDUIT	3.63	0	12:06	7.04	0.28	0.22
DR5-3867	CONDUIT	34.42	0	12:00	4.47	0.50	0.71
DR5-3869	CONDUIT	60.88	0	12:26	5.16	1.12	1.00
DR5-3883	CONDUIT	37.53	0	12:00	11.30	1.37	0.65
DR5-3886.1	CONDUIT	23.27	0	12:00	7.41	0.99	1.00
DR5-3897	CONDUIT	27.27	0	12:01	6.66	1.16	1.00
DR5-3901	CONDUIT	114.59	0	12:07	8.11	2.11	0.95
DR5-3908	CONDUIT	19.47	0	12:41	3.46	0.89	1.00
DR5-3913	CONDUIT	29.48	0	12:32	10.10	3.08	1.00
DR5-3914.1	CONDUIT	91.15	0	12:08	7.25	1.28	1.00
DR5-3915	CONDUIT	28.81	0	12:24	9.92	0.68	1.00
DR5-3949	CONDUIT	13.66	0	12:00	3.44	0.72	1.00
DR5-3963	CONDUIT	1.97	0	12:01	0.63	0.05	1.00
DR5-4094	CONDUIT	93.04	0	12:08	7.40	1.31	1.00
DR5-4201	CONDUIT	19.64	0	12:41	3.31	0.90	1.00
DR5-4202	CONDUIT	15.90	0	12:00	5.06	0.81	1.00
DR5-4205	CONDUIT	131.13	0	12:05	5.52	1.28	1.00
DR5-4223	CONDUIT	19.78	0	12:07	6.30	1.27	1.00
DR5-4224.1	CONDUIT	14.34	0	12:08	4.56	0.76	1.00
DR5-4227	CONDUIT	16.13	0	12:14	5.14	1.03	1.00
DR5-4229	CONDUIT	32.72	0	12:00	5.38	0.72	0.97
DR5-4232	CONDUIT	18.36	0	12:26	5.84	1.40	1.00
DR5-4271	CONDUIT	108.60	0	11:57	8.82	2.05	1.00
DR5-4274	CONDUIT	39.06	0	12:01	4.27	0.57	0.65
DR5-4300	CONDUIT	60.36	0	12:26	4.98	1.11	1.00
DR5-4310.1	CONDUIT	13.04	0	12:17	4.15	1.17	1.00
DR5-4314.1	CONDUIT	29.30	0	12:25	4.16	0.40	1.00
DR5-4323.1	CONDUIT	36.18	0	12:11	0.37	0.07	1.00
DR5-4337	CONDUIT	20.53	0	12:00	7.03	1.03	0.88
DR5-4342	CONDUIT	15.48	0	12:10	6.56	0.99	1.00
DR5-4356.1	CONDUIT	5.60	0	12:44	1.78	0.42	1.00
DR5-4399	CONDUIT	33.49	0	12:45	6.82	1.30	1.00
DR5-4431	CONDUIT	116.38	0	12:00	9.26	4.17	1.00
DR5-4437	CONDUIT	1.07	0	12:04	1.04	0.01	1.00
DR5-4470	CONDUIT	50.38	0	12:03	10.54	2.41	1.00

## Briarfield10yrtwExisting-10yr24hr

DR5-4472	CONDUIT	58.33	0	12:27	6.06	1.47	1.00
DR5-4473	CONDUIT	44.15	0	12:04	4.50	1.08	1.00
DR5-4474	CONDUIT	21.29	0	12:01	5.14	0.91	0.83
DR5-4477	CONDUIT	101.06	0	12:08	6.57	1.86	1.00
DR5-4511	CONDUIT	74.08	0	12:08	5.89	1.04	1.00
DR5-4513	CONDUIT	25.58	0	11:55	8.14	2.26	1.00
DR5-4522	CONDUIT	5.96	0	12:12	6.14	2.20	1.00
DR5-4536	CONDUIT	77.54	0	12:11	7.02	0.74	0.87
DR5-4557	CONDUIT	35.21	0	12:00	3.66	0.74	1.00
DR5-4561	CONDUIT	49.70	0	12:12	6.49	1.52	1.00
DR5-4661	CONDUIT	12.76	0	11:59	4.06	0.87	1.00
DR5-4674	CONDUIT	10.09	0	11:56	3.21	0.75	1.00
DR5-4681	CONDUIT	14.41	0	11:55	7.73	0.77	1.00
DR5-5148	CONDUIT	15.80	0	12:14	12.87	3.85	1.00
DR5-5149	CONDUIT	6.98	0	11:55	5.69	1.39	1.00
DR5-5150	CONDUIT	13.03	0	12:14	10.62	2.06	1.00
DR5-5153	CONDUIT	6.22	0	12:00	4.56	0.17	0.72
DR5-5154	CONDUIT	20.32	0	11:59	16.56	1.15	1.00
DR5-5181	CONDUIT	31.26	0	12:06	9.95	17.07	1.00
DR5-5207	CONDUIT	5.38	0	11:56	1.10	0.08	1.00
DR5-5210	CONDUIT	32.35	0	12:22	6.59	1.04	1.00
DR5-5211	CONDUIT	31.88	0	12:22	6.49	2.68	1.00
DR5-5213	CONDUIT	29.13	0	12:22	5.93	2.09	1.00
DR5-5214	CONDUIT	30.54	0	12:24	9.72	1.65	1.00
DR5-5224	CONDUIT	123.60	0	12:00	7.77	0.66	1.00
Link3595	CONDUIT	31.18	0	11:56	4.41	0.77	1.00
Link3597	CONDUIT	0.81	0	13:27	0.02	0.00	1.00
MN01.1	CONDUIT	24.62	0	12:11	1.28	0.08	0.42
MN02.1	CONDUIT	12.43	0	12:00	2.55	0.13	0.49
MN03.1	CONDUIT	17.86	0	12:00	0.84	0.13	0.85
MN04.1	CONDUIT	114.78	0	12:06	2.25	0.19	0.65
MN05.1	CONDUIT	153.80	0	12:32	1.51	0.18	0.61
MN06.1	CONDUIT	17.06	0	12:00	0.83	0.02	0.33
MN07.1	CONDUIT	8.76	0	12:01	0.72	0.01	0.28
MN08.1	CONDUIT	227.09	0	12:25	2.29	0.68	0.85
MN09.1	CONDUIT	140.50	0	12:06	7.16	2.83	1.00
MN10.1	CONDUIT	21.25	0	12:01	0.43	0.03	0.70
MN11.1	CONDUIT	32.07	0	11:59	0.94	0.19	1.00
MN12.1	CONDUIT	79.21	0	11:59	5.12	0.87	1.00
MN13.1	CONDUIT	100.95	0	11:58	6.35	0.60	1.00
MN14.1	CONDUIT	99.50	0	11:58	6.26	1.30	1.00
MN15	CONDUIT	50.59	0	12:04	3.02	0.82	1.00
MN16	CONDUIT	26.85	0	12:01	1.52	0.24	1.00
MN17	CONDUIT	308.99	0	12:23	4.47	0.06	0.61

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MN18	CONDUIT	69.02	0	12:06	1.04	0.15	0.90
MN19	CONDUIT	23.24	0	12:05	0.65	0.10	1.00
MN20	CONDUIT	150.30	0	12:06	1.59	0.20	0.91
MN22	CONDUIT	39.52	0	12:00	0.95	0.06	0.71
MN23	CONDUIT	39.14	0	12:00	0.48	0.17	0.91
MN24	CONDUIT	225.95	0	12:28	1.64	0.65	0.86
MN26	CONDUIT	289.11	0	12:29	2.69	0.48	0.76
MN27	CONDUIT	456.50	0	12:28	2.40	0.97	1.00
MN31	CONDUIT	47.30	0	12:01	0.95	0.14	0.87
MN33	CONDUIT	122.24	0	12:07	2.13	1.35	1.00
MN35	CONDUIT	163.36	0	12:09	3.30	0.28	1.00
MN37	CONDUIT	181.40	0	12:02	1.71	0.74	1.00
MN38	CONDUIT	174.61	0	12:02	2.64	1.12	1.00
MN41	CONDUIT	31.77	0	12:02	1.57	0.09	0.61
MN42	CONDUIT	5.07	0	12:07	0.31	0.01	0.29
MN43	CONDUIT	19.62	0	12:07	0.35	0.03	0.61
MN44	CONDUIT	16.18	0	12:19	5.15	1.12	1.00
MN45	CONDUIT	47.06	0	12:15	6.66	0.94	1.00
TownPark	WEIR	8.81	0	14:33			1.00

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Flow Classification Summary

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Conduit	Length	Adjusted Fraction of Time in Flow Class									
		/Actual	Up	Down	Sub	Sup	Up	Down	Norm	Inlet	
Dry	Dry	Dry	Crit	Crit	Crit	Crit	Crit	Ltd	Ctrl		
DR5-0281	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00
DR5-0308	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-0380	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-0711	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-0713	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-0715.1	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.03	0.00	
DR5-0789	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.34	0.00	
DR5-0794.1	1.00	0.02	0.00	0.00	0.30	0.68	0.00	0.00	0.97	0.00	
DR5-0800.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
DR5-0827	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.01	0.00	
DR5-0830.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-0832	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-0836	1.00	0.02	0.00	0.00	0.95	0.03	0.00	0.00	0.96	0.00	
DR5-0851	1.00	0.02	0.00	0.00	0.97	0.00	0.00	0.01	0.00	0.00	

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DR5-0863.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-0881	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04	0.00	
DR5-0882	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.06	0.00	
DR5-0886	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
DR5-0894	1.00	0.02	0.00	0.00	0.53	0.46	0.00	0.00	0.05	0.00	
DR5-0922	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-0925.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-0932.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.05	0.00	
DR5-0934	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-0941	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-0946	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.00	0.00	
DR5-0959	1.00	0.02	0.00	0.00	0.96	0.03	0.00	0.00	0.04	0.00	
DR5-0960	1.00	0.02	0.00	0.00	0.95	0.04	0.00	0.00	0.00	0.00	
DR5-0966.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-0973.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.19	0.00	
DR5-0979	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-0985	1.00	0.02	0.00	0.00	0.90	0.09	0.00	0.00	0.19	0.00	
DR5-0987	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1000	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1012.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.09	0.00	
DR5-1013	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.52	0.00	
DR5-1014	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	
DR5-1016	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1032.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.28	0.00	
DR5-1034.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1041	1.00	0.02	0.00	0.00	0.74	0.25	0.00	0.00	0.29	0.00	
DR5-1044	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1045	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1046	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1048	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1049	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1050	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1051	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.03	0.00	
DR5-1058	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
DR5-1067	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1069	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.23	0.00	
DR5-1070	1.00	0.02	0.00	0.00	0.50	0.49	0.00	0.00	0.00	0.00	
DR5-1088	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
DR5-1091	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1094	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	
DR5-1098	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1101	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1104	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1111	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	

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DR5-1119	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-1120	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-1121	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.14	0.00	
DR5-1127	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	
DR5-1137	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
DR5-1146	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
DR5-1149	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1155	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	
DR5-1164	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.05	0.00	
DR5-1176	1.00	0.02	0.00	0.00	0.37	0.61	0.00	0.00	0.41	0.00	
DR5-1181	1.00	0.02	0.03	0.00	0.95	0.00	0.00	0.00	0.42	0.00	
DR5-1187	1.00	0.02	0.00	0.00	0.27	0.72	0.00	0.00	0.02	0.00	
DR5-1196	1.00	0.02	0.00	0.00	0.64	0.34	0.00	0.00	0.56	0.00	
DR5-1197	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	
DR5-1201	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.94	0.00	
DR5-1205	1.00	0.02	0.00	0.00	0.79	0.20	0.00	0.00	0.46	0.00	
DR5-1208	1.00	0.02	0.00	0.00	0.33	0.66	0.00	0.00	0.00	0.00	
DR5-1212	1.00	0.02	0.00	0.00	0.05	0.00	0.00	0.93	0.04	0.00	
DR5-1213	1.00	0.02	0.00	0.00	0.92	0.07	0.00	0.00	0.61	0.00	
DR5-1217	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1218	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1228	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1233	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1236	1.00	0.02	0.00	0.00	0.18	0.80	0.00	0.00	0.00	0.00	
DR5-1240	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1244	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1253	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1255	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1304	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1305	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1307	1.00	0.02	0.00	0.00	0.30	0.68	0.00	0.00	0.97	0.00	
DR5-1314	1.00	0.02	0.00	0.00	0.97	0.01	0.00	0.00	0.96	0.00	
DR5-1414	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1584	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
DR5-1591.1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.98	0.00	
DR5-1600	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
DR5-1603	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.26	0.00	
DR5-1606	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.10	0.00	
DR5-1609	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	
DR5-1616	1.00	0.02	0.00	0.00	0.97	0.01	0.00	0.00	0.82	0.00	
DR5-1619	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	
DR5-1634	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	
DR5-1637.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00	
DR5-1670	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.96	0.00	

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DR5-1672.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.00
DR5-1692	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1694.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-1703	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1706	1.00	0.02	0.00	0.00	0.95	0.03	0.00	0.00	0.06	0.00
DR5-1710	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.23	0.00
DR5-1712	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.24	0.00
DR5-1715	1.00	0.02	0.00	0.00	0.91	0.07	0.00	0.00	0.00	0.00
DR5-1724	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.03	0.00
DR5-1727	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1732.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.05	0.00
DR5-1736	1.00	0.02	0.00	0.00	0.43	0.55	0.00	0.00	0.37	0.00
DR5-1742	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1743	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1745	1.00	0.02	0.00	0.00	0.27	0.71	0.00	0.00	0.01	0.00
DR5-1747	1.00	0.02	0.00	0.00	0.16	0.82	0.00	0.00	0.02	0.00
DR5-1755	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1758	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.95	0.00
DR5-1759	1.00	0.02	0.00	0.00	0.07	0.00	0.91	0.00	0.00	0.00
DR5-1762	1.00	0.02	0.00	0.00	0.06	0.00	0.00	0.93	0.00	0.00
DR5-1764	1.00	0.02	0.00	0.00	0.33	0.66	0.00	0.00	0.00	0.00
DR5-1772	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1778	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.60	0.00
DR5-1781.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1786	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1787.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1791	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1793	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.26	0.00
DR5-1794	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.17	0.00
DR5-1795.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04	0.00
DR5-1796.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-1835	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.03	0.00
DR5-1838	1.00	0.02	0.00	0.00	0.47	0.52	0.00	0.00	0.95	0.00
DR5-1839	1.00	0.02	0.00	0.00	0.27	0.71	0.00	0.00	0.94	0.00
DR5-1840	1.00	0.02	0.00	0.00	0.11	0.88	0.00	0.00	0.13	0.00
DR5-1868	1.00	0.02	0.03	0.00	0.96	0.00	0.00	0.00	0.04	0.00
DR5-1871	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-1872	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-1998	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.03	0.00
DR5-1999	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-2129	1.00	0.02	0.00	0.00	0.79	0.20	0.00	0.00	0.55	0.00
DR5-2241.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-2242.1	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.00	0.00
DR5-2288	1.00	0.02	0.00	0.00	0.94	0.05	0.00	0.00	0.05	0.00

Briarfield10yrtwExisting-10yr24hr

DR5-2289	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2303	1.00	0.02	0.00	0.00	0.94	0.00	0.00	0.04	0.00	0.00	0.00
DR5-2308	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2309	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2313	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2328	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2331	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2370	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2378	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.94	0.00	0.00
DR5-2404	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	0.00
DR5-2430	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00	0.00
DR5-2447	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2512	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2513	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.28	0.00	0.00
DR5-2531	1.00	0.02	0.00	0.00	0.88	0.10	0.00	0.00	0.97	0.00	0.00
DR5-2534	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2563	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2572	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2691	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.00	0.00
DR5-2710	1.00	0.02	0.00	0.00	0.29	0.70	0.00	0.00	0.00	0.00	0.00
DR5-2727	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2736	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2737	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2744	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04	0.00	0.00
DR5-2746	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2747	1.00	0.02	0.00	0.00	0.26	0.73	0.00	0.00	0.02	0.00	0.00
DR5-2792	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2801	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2804	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00	0.00
DR5-2834	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2837.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2839	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2871	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.09	0.00	0.00
DR5-2880	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2884.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2885	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2886.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2961	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2962	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-2968	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.01	0.02	0.00	0.00
DR5-2976	1.00	0.02	0.00	0.00	0.00	0.98	0.00	0.00	0.01	0.00	0.00
DR5-3011	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-3017	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00
DR5-3129	1.00	0.00	0.00	0.00	0.98	0.00	0.02	0.00	0.00	0.00	0.00

## Briarfield10yrtwExisting-10yr24hr

DR5-3144	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00
DR5-3162	1.00	0.02	0.00	0.00	0.71	0.00	0.00	0.27	0.00	0.00
DR5-3172	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3175	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3179	1.00	0.02	0.00	0.00	0.94	0.05	0.00	0.00	0.61	0.00
DR5-3255	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3256	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3339	1.00	0.02	0.00	0.00	0.29	0.70	0.00	0.00	0.97	0.00
DR5-3373	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3405	1.00	0.02	0.00	0.00	0.29	0.70	0.00	0.00	0.57	0.00
DR5-3448	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-3450	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-3451	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.04	0.00
DR5-3456	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.33	0.00
DR5-3508	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
DR5-3703	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.45	0.00
DR5-3733	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3754	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-3757.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3759	1.00	0.02	0.00	0.00	0.97	0.01	0.00	0.00	0.09	0.00
DR5-3775	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
DR5-3777	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3792.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-3793	1.00	0.02	0.00	0.00	0.97	0.02	0.00	0.00	0.08	0.00
DR5-3795	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-3820	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.27	0.00
DR5-3824	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3834.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3839	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.00
DR5-3842.1	1.00	0.02	0.00	0.00	0.29	0.70	0.00	0.00	0.01	0.00
DR5-3847	1.00	0.02	0.00	0.00	0.31	0.67	0.00	0.00	0.75	0.00
DR5-3851	1.00	0.02	0.00	0.00	0.97	0.02	0.00	0.00	0.09	0.00
DR5-3854	1.00	0.02	0.00	0.00	0.97	0.02	0.00	0.00	0.00	0.00
DR5-3866.1	1.00	0.02	0.00	0.00	0.29	0.69	0.00	0.00	0.03	0.00
DR5-3867	1.00	0.01	0.00	0.00	0.98	0.01	0.00	0.00	0.93	0.00
DR5-3869	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3883	1.00	0.02	0.00	0.00	0.23	0.76	0.00	0.00	0.06	0.00
DR5-3886.1	1.00	0.02	0.00	0.00	0.74	0.25	0.00	0.00	0.96	0.00
DR5-3897	1.00	0.02	0.00	0.00	0.36	0.62	0.00	0.00	0.00	0.00
DR5-3901	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3908	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3913	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.33	0.00
DR5-3914.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-3915	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.96	0.00

## Briarfield10yrtwExisting-10yr24hr

DR5-3949	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
DR5-3963	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
DR5-4094	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00
DR5-4201	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4202	1.00	0.02	0.00	0.00	0.37	0.62	0.00	0.00	0.94	0.00
DR5-4205	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4223	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00
DR5-4224.1	1.00	0.02	0.00	0.00	0.90	0.09	0.00	0.00	0.31	0.00
DR5-4227	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00
DR5-4229	1.00	0.02	0.00	0.00	0.94	0.05	0.00	0.00	0.13	0.00
DR5-4232	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4271	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.00	0.00
DR5-4274	1.00	0.02	0.00	0.00	0.96	0.02	0.00	0.00	0.00	0.00
DR5-4300	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
DR5-4310.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4314.1	1.00	0.02	0.00	0.00	0.92	0.06	0.00	0.00	0.96	0.00
DR5-4323.1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
DR5-4337	1.00	0.02	0.00	0.00	0.35	0.63	0.00	0.00	0.96	0.00
DR5-4342	1.00	0.02	0.00	0.00	0.35	0.64	0.00	0.00	0.30	0.00
DR5-4356.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4399	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4431	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4437	1.00	0.02	0.00	0.00	0.96	0.03	0.00	0.00	0.12	0.00
DR5-4470	1.00	0.02	0.00	0.00	0.87	0.11	0.00	0.00	0.00	0.00
DR5-4472	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4473	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.00
DR5-4474	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
DR5-4477	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4511	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4513	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4522	1.00	0.02	0.00	0.00	0.80	0.19	0.00	0.00	0.00	0.00
DR5-4536	1.00	0.02	0.00	0.00	0.97	0.01	0.00	0.00	0.00	0.00
DR5-4557	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4561	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4661	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
DR5-4674	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-4681	1.00	0.02	0.00	0.00	0.23	0.75	0.00	0.00	0.00	0.00
DR5-5148	1.00	0.02	0.00	0.00	0.18	0.81	0.00	0.00	0.04	0.00
DR5-5149	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-5150	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.65	0.00
DR5-5153	1.00	0.02	0.09	0.00	0.87	0.03	0.00	0.00	0.98	0.00
DR5-5154	1.00	0.00	0.02	0.00	0.97	0.02	0.00	0.00	0.97	0.00
DR5-5181	1.00	0.02	0.00	0.00	0.69	0.30	0.00	0.00	0.06	0.00
DR5-5207	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00

Briarfield10yrtwExisting-10yr24hr

DR5-5210	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00
DR5-5211	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
DR5-5213	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04	0.00
DR5-5214	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.63	0.00
DR5-5224	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
Link3595	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
Link3597	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MN01.1	1.00	0.02	0.01	0.00	0.98	0.00	0.00	0.00	0.40	0.00
MN02.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.56	0.00
MN03.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.70	0.00
MN04.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.32	0.00
MN05.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN06.1	1.00	0.01	0.00	0.00	0.98	0.00	0.00	0.00	0.67	0.00
MN07.1	1.00	0.01	0.00	0.00	0.98	0.00	0.00	0.00	0.66	0.00
MN08.1	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
MN09.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN10.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.03	0.00
MN11.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04	0.00
MN12.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN13.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN14.1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN15	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN16	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.25	0.00
MN17	1.00	0.02	0.00	0.00	0.98	0.01	0.00	0.00	0.91	0.00
MN18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN19	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
MN20	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.61	0.00
MN23	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN24	1.00	0.02	0.02	0.00	0.96	0.00	0.00	0.00	0.01	0.00
MN26	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN27	1.00	0.02	0.01	0.00	0.98	0.00	0.00	0.00	0.01	0.00
MN31	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04	0.00
MN33	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN35	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.08	0.00
MN37	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN38	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN41	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.26	0.00
MN42	1.00	0.02	0.02	0.00	0.97	0.00	0.00	0.00	0.94	0.00
MN43	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
MN44	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
MN45	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.96	0.00

## Briarfield10yrtwExisting-10yr24hr

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## Conduit Surcharge Summary

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Conduit	Hours		Hours		Capacity
	Both Ends	Full	Above Full	Dnstream	
DR5-0281	1.28	1.28	1.29	0.57	0.59
DR5-0711	0.70	0.70	0.70	0.06	0.08
DR5-0713	1.48	1.48	1.48	0.34	0.01
DR5-0715.1	1.77	1.77	1.81	0.01	0.01
DR5-0800.1	31.87	31.87	31.87	0.18	0.18
DR5-0827	1.10	1.10	1.11	0.11	0.11
DR5-0830.1	0.95	0.95	0.95	0.83	0.79
DR5-0832	0.60	0.60	0.60	0.33	0.31
DR5-0836	0.28	0.28	0.28	0.19	0.19
DR5-0851	2.67	2.67	2.67	2.63	2.55
DR5-0863.1	31.41	31.41	31.41	0.01	0.01
DR5-0881	0.29	0.29	0.29	0.01	0.01
DR5-0882	0.67	0.67	0.67	0.01	0.01
DR5-0886	33.10	33.10	33.10	0.01	0.01
DR5-0894	0.44	0.44	0.44	0.05	0.04
DR5-0922	0.41	0.41	0.41	0.33	0.32
DR5-0925.1	0.88	0.88	0.88	0.01	0.01
DR5-0932.1	30.38	30.38	30.38	0.01	0.01
DR5-0934	33.28	33.28	33.28	0.08	0.08
DR5-0941	33.27	33.27	33.27	0.32	0.32
DR5-0946	0.31	0.31	0.31	0.68	0.30
DR5-0959	27.57	27.57	27.58	0.01	0.01
DR5-0960	27.03	27.03	27.04	0.18	0.18
DR5-0966.1	31.43	31.43	31.43	0.88	0.87
DR5-0973.1	0.33	0.33	0.34	0.30	0.29
DR5-0979	1.51	1.51	1.51	0.82	0.82
DR5-0985	24.38	24.38	24.38	0.01	0.01
DR5-0987	33.51	33.51	33.51	0.56	0.56
DR5-1000	31.21	31.21	31.21	0.87	0.85
DR5-1012.1	0.32	0.32	0.33	0.01	0.02
DR5-1013	0.30	0.30	0.30	0.01	0.01
DR5-1014	1.48	1.48	1.48	0.01	0.01
DR5-1016	24.15	24.15	24.15	0.01	0.01
DR5-1032.1	0.47	0.47	0.47	0.01	0.01
DR5-1041	0.32	0.32	0.32	0.16	0.14

## Briarfield10yrtwExisting-10yr24hr

DR5-1044	0.95	0.95	0.95	0.52	0.54
DR5-1045	1.40	1.40	1.40	0.02	0.01
DR5-1046	0.01	0.01	0.01	1.45	0.01
DR5-1048	1.40	1.40	1.40	1.45	1.39
DR5-1049	0.32	0.32	0.32	0.56	0.32
DR5-1050	1.40	1.40	1.40	1.45	1.40
DR5-1051	1.40	1.40	1.40	0.48	0.50
DR5-1058	33.42	33.42	33.45	0.78	0.78
DR5-1067	0.20	0.20	0.20	0.52	0.20
DR5-1069	1.62	1.62	1.62	1.43	1.46
DR5-1070	0.71	0.71	0.71	1.90	0.71
DR5-1088	33.79	33.79	33.79	0.34	0.34
DR5-1091	0.34	0.34	0.34	0.01	0.01
DR5-1094	0.27	0.27	0.27	0.01	0.01
DR5-1098	1.26	1.26	1.26	0.01	0.01
DR5-1101	33.77	33.77	33.77	0.01	0.01
DR5-1104	1.24	1.24	1.24	1.45	1.24
DR5-1111	0.59	0.59	0.59	0.01	0.12
DR5-1119	1.03	1.03	1.03	0.39	0.32
DR5-1120	0.54	0.54	0.56	0.06	0.34
DR5-1121	2.29	2.29	2.29	2.01	1.67
DR5-1127	0.74	0.74	0.74	0.13	0.01
DR5-1137	34.40	34.40	34.40	0.01	0.01
DR5-1146	33.84	33.84	33.84	0.01	0.01
DR5-1149	0.85	0.85	0.85	0.45	0.49
DR5-1155	33.39	33.39	33.41	0.01	0.01
DR5-1164	0.67	0.67	0.67	0.01	0.01
DR5-1181	0.54	0.54	0.54	0.01	0.02
DR5-1208	0.01	0.01	0.01	0.19	0.01
DR5-1217	1.53	1.53	1.53	1.62	1.52
DR5-1218	0.57	0.57	0.57	0.14	0.17
DR5-1228	1.03	1.03	1.03	0.56	0.48
DR5-1233	0.55	0.55	0.56	0.04	0.06
DR5-1236	0.01	0.01	0.01	1.27	0.01
DR5-1240	0.75	0.75	0.76	0.01	0.11
DR5-1244	0.71	0.71	0.71	1.92	0.01
DR5-1253	2.29	2.29	2.31	1.50	1.27
DR5-1255	2.52	2.52	2.53	1.82	0.10
DR5-1304	2.47	2.47	2.47	1.12	0.03
DR5-1305	2.49	2.49	2.49	2.48	0.06
DR5-1307	0.41	0.41	0.41	0.01	0.01
DR5-1314	0.53	0.53	0.54	0.01	0.01
DR5-1414	1.10	1.10	1.10	1.55	1.10
DR5-1584	34.38	34.38	34.38	0.01	0.01

## Briarfield10yrtwExisting-10yr24hr

DR5-1600	34.57	34.57	34.57	2.72	1.89
DR5-1603	2.46	2.46	2.46	0.26	0.41
DR5-1606	26.40	26.40	26.40	0.01	0.01
DR5-1609	2.67	2.67	2.67	2.56	2.56
DR5-1616	2.55	2.55	2.55	0.01	0.01
DR5-1619	2.55	2.55	2.55	0.01	0.01
DR5-1634	2.43	2.43	2.44	0.05	0.24
DR5-1670	0.31	0.31	0.31	0.01	0.01
DR5-1672.1	24.87	24.87	24.87	0.01	0.01
DR5-1692	0.14	0.14	0.14	1.42	0.01
DR5-1694.1	34.60	34.60	34.60	0.32	0.32
DR5-1703	33.75	33.75	33.75	0.01	0.01
DR5-1706	0.57	0.57	0.57	0.01	0.01
DR5-1710	0.54	0.54	0.54	0.03	0.03
DR5-1712	0.72	0.72	0.72	0.73	0.71
DR5-1724	0.85	0.85	0.86	0.82	0.78
DR5-1727	0.61	0.61	0.61	0.32	0.28
DR5-1732.1	1.52	1.52	1.52	0.18	0.18
DR5-1742	1.01	1.01	1.01	0.59	0.51
DR5-1743	0.57	0.57	0.57	0.09	0.13
DR5-1745	0.61	0.61	0.61	0.01	0.01
DR5-1755	0.56	0.56	0.56	0.05	0.07
DR5-1758	0.74	0.74	0.74	0.01	0.01
DR5-1759	1.01	1.01	1.01	0.01	0.01
DR5-1762	1.22	1.22	1.22	1.52	1.17
DR5-1764	0.01	0.01	0.01	0.37	0.01
DR5-1772	1.70	1.70	1.70	2.78	1.70
DR5-1778	0.71	0.71	0.71	0.70	0.70
DR5-1781.1	0.10	0.10	0.10	0.52	0.10
DR5-1786	0.98	0.98	0.98	1.05	0.95
DR5-1787.1	0.94	0.94	0.95	0.55	0.60
DR5-1791	0.98	0.98	0.98	0.45	0.31
DR5-1793	0.66	0.66	0.66	0.03	0.03
DR5-1794	0.66	0.66	0.66	0.10	0.10
DR5-1795.1	0.60	0.60	0.60	0.06	0.14
DR5-1796.1	2.38	2.38	2.40	1.19	0.94
DR5-1868	27.27	27.27	27.27	0.01	0.01
DR5-1871	24.35	24.35	24.35	0.16	0.16
DR5-1872	24.07	24.07	24.07	0.12	0.12
DR5-1998	0.18	0.18	0.18	0.01	0.01
DR5-1999	33.75	33.75	33.75	0.02	0.03
DR5-2241.1	0.43	0.43	0.43	0.01	0.01
DR5-2242.1	0.95	0.95	0.95	0.01	0.01
DR5-2289	34.36	34.36	34.36	0.01	0.01

## Briarfield10yrtwExisting-10yr24hr

DR5-2303	26.83	26.83	26.83	0.01	0.01
DR5-2308	0.62	0.62	0.62	0.43	0.42
DR5-2309	0.77	0.77	0.77	1.20	0.76
DR5-2313	1.50	1.50	1.50	0.01	0.02
DR5-2328	0.12	0.12	0.12	0.01	0.01
DR5-2331	32.33	32.33	32.33	0.01	0.01
DR5-2370	1.23	1.23	1.23	1.68	1.19
DR5-2378	0.78	0.78	0.79	0.01	0.01
DR5-2404	0.71	0.71	0.71	0.01	0.02
DR5-2430	27.57	27.57	27.57	0.01	0.01
DR5-2447	1.00	1.00	1.00	0.80	0.61
DR5-2512	0.78	0.78	0.78	0.01	0.01
DR5-2513	22.18	22.18	22.21	0.02	0.03
DR5-2531	0.21	0.21	0.21	0.01	0.01
DR5-2534	1.40	1.40	1.40	0.77	0.70
DR5-2563	0.93	0.93	0.93	0.85	0.61
DR5-2572	33.31	33.31	33.31	0.01	0.01
DR5-2727	33.72	33.72	33.72	0.20	0.20
DR5-2736	0.59	0.59	0.59	0.29	0.17
DR5-2737	0.49	0.49	0.51	0.05	0.06
DR5-2744	0.18	0.18	0.18	0.01	0.01
DR5-2746	31.32	31.32	31.33	0.60	0.60
DR5-2747	0.28	0.28	0.28	0.47	0.28
DR5-2792	0.56	0.56	0.56	0.06	0.10
DR5-2801	1.01	1.01	1.01	0.32	0.20
DR5-2804	0.52	0.52	0.53	0.01	0.03
DR5-2834	1.03	1.03	1.03	0.44	0.34
DR5-2837.1	0.14	0.14	0.14	0.01	0.01
DR5-2839	0.72	0.72	0.72	0.37	0.36
DR5-2871	1.38	1.38	1.39	1.59	1.31
DR5-2880	0.01	0.01	0.01	6.53	0.01
DR5-2884.1	1.96	1.96	1.96	1.26	1.24
DR5-2885	1.92	1.92	1.93	1.70	1.68
DR5-2886.1	1.58	1.58	1.59	1.90	1.43
DR5-2961	0.70	0.70	0.70	0.01	0.01
DR5-3011	1.55	1.55	1.55	1.54	0.01
DR5-3017	0.91	0.91	0.91	0.51	0.52
DR5-3129	30.97	30.97	30.97	0.01	0.01
DR5-3144	34.06	34.06	34.06	0.22	0.20
DR5-3162	0.01	0.01	0.01	1.17	0.01
DR5-3172	33.67	33.67	33.67	0.33	0.34
DR5-3175	0.58	0.58	0.59	0.19	0.08
DR5-3179	0.77	0.77	0.77	0.01	0.01
DR5-3255	0.16	0.16	0.16	0.01	0.01

## Briarfield10yrtwExisting-10yr24hr

DR5-3256	0.16	0.16	0.16	0.01	0.02
DR5-3339	0.26	0.26	0.26	0.01	0.01
DR5-3373	1.56	1.56	1.56	1.71	1.56
DR5-3448	34.29	34.29	34.29	0.01	0.01
DR5-3450	34.01	34.01	34.01	0.01	0.01
DR5-3451	0.29	0.29	0.29	0.01	0.01
DR5-3456	1.44	1.44	1.46	0.93	0.65
DR5-3508	0.18	0.18	0.18	0.01	0.01
DR5-3703	0.01	0.01	0.01	0.09	0.01
DR5-3733	31.59	31.59	31.59	0.26	0.25
DR5-3754	34.12	34.12	34.12	0.91	0.10
DR5-3757.1	0.46	0.46	0.46	0.01	0.01
DR5-3759	0.40	0.40	0.40	0.01	0.01
DR5-3775	32.14	32.14	32.14	0.01	0.01
DR5-3777	2.37	2.37	2.38	0.83	1.19
DR5-3792.1	33.84	33.84	33.84	0.01	0.01
DR5-3793	24.78	24.78	24.78	0.01	0.01
DR5-3795	33.74	33.74	33.74	1.74	1.74
DR5-3820	0.62	0.62	0.62	0.01	0.01
DR5-3824	33.35	33.35	33.35	0.10	0.11
DR5-3839	1.02	1.02	1.02	0.01	0.01
DR5-3842.1	0.51	0.51	0.51	0.01	0.01
DR5-3851	1.34	1.34	1.34	0.01	0.01
DR5-3854	0.68	0.68	0.68	0.01	0.01
DR5-3867	0.01	0.01	0.01	0.01	0.01
DR5-3869	0.58	0.58	0.58	0.33	0.25
DR5-3883	0.01	0.01	0.01	0.13	0.01
DR5-3886.1	0.01	0.01	0.01	0.01	0.01
DR5-3897	0.43	0.43	0.43	0.14	0.01
DR5-3901	0.01	0.01	0.01	0.56	0.01
DR5-3908	0.74	0.74	0.75	0.01	0.07
DR5-3913	0.37	0.37	0.37	1.00	0.01
DR5-3914.1	0.35	0.35	0.35	0.30	0.29
DR5-3915	0.37	0.37	0.37	0.01	0.01
DR5-3949	0.19	0.19	0.19	0.01	0.01
DR5-3963	0.29	0.29	0.29	0.01	0.01
DR5-4094	0.35	0.35	0.35	0.36	0.34
DR5-4201	0.69	0.69	0.70	0.01	0.05
DR5-4202	0.30	0.30	0.30	0.01	0.01
DR5-4205	0.86	0.86	0.86	0.51	0.52
DR5-4223	33.40	33.40	33.40	0.33	0.33
DR5-4224.1	0.30	0.30	0.30	0.01	0.01
DR5-4227	33.27	33.27	33.27	0.06	0.07
DR5-4229	0.01	0.01	0.01	0.20	0.01

## Briarfield10yrtwExisting-10yr24hr

DR5-4232	0.55	0.55	0.55	0.09	0.11
DR5-4271	0.69	0.69	0.69	1.21	0.67
DR5-4274	0.01	0.01	0.01	0.12	0.01
DR5-4300	0.57	0.57	0.57	0.23	0.19
DR5-4310.1	33.54	33.54	33.54	0.54	0.54
DR5-4314.1	0.55	0.55	0.55	0.01	0.01
DR5-4323.1	24.09	24.09	24.09	0.01	0.01
DR5-4337	0.01	0.01	0.01	0.02	0.01
DR5-4342	0.74	0.74	0.74	0.01	0.01
DR5-4356.1	33.92	33.92	33.92	0.01	0.01
DR5-4399	1.49	1.49	1.50	0.60	0.42
DR5-4431	30.52	30.52	30.54	0.77	1.13
DR5-4437	0.98	0.98	0.98	0.01	0.01
DR5-4470	0.90	0.90	0.91	2.06	0.90
DR5-4472	0.59	0.59	0.59	0.14	0.04
DR5-4473	0.85	0.85	0.85	1.93	0.27
DR5-4477	0.01	0.01	0.01	0.53	0.01
DR5-4511	0.35	0.35	0.35	0.06	0.06
DR5-4513	1.98	1.98	1.98	0.73	0.73
DR5-4522	0.26	0.26	0.26	0.81	0.24
DR5-4557	0.39	0.39	0.39	0.01	0.01
DR5-4561	0.40	0.40	0.40	0.61	0.40
DR5-4661	32.77	32.77	32.77	0.01	0.01
DR5-4674	27.70	27.70	27.70	0.01	0.01
DR5-4681	0.50	0.50	0.50	0.01	0.01
DR5-5148	0.33	0.33	0.33	0.66	0.33
DR5-5149	0.39	0.39	0.39	0.27	0.01
DR5-5150	0.39	0.39	0.39	0.41	0.39
DR5-5154	0.33	0.33	0.33	0.33	0.33
DR5-5181	2.55	2.55	2.55	10.02	2.53
DR5-5207	0.49	0.49	0.49	0.01	0.01
DR5-5210	0.49	0.49	0.49	0.04	0.01
DR5-5211	0.50	0.50	0.50	0.38	0.31
DR5-5213	0.53	0.53	0.53	0.16	0.17
DR5-5214	0.54	0.54	0.54	0.05	0.05
DR5-5224	0.46	0.46	0.46	0.01	0.01
Link3595	1.53	1.53	1.53	0.01	0.01
Link3597	27.95	27.95	27.95	0.01	0.01
MN09.1	31.29	31.29	31.29	0.98	0.98
MN11.1	0.44	0.44	0.44	0.01	0.01
MN12.1	0.58	0.58	0.58	0.01	0.01
MN13.1	0.60	0.60	0.60	0.01	0.10
MN14.1	0.61	0.61	0.61	0.28	0.32
MN15	0.92	0.92	0.92	0.01	0.01

Briarfield10yrtwExisting-10yr24hr

MN16	0.66	0.66	0.66	0.01	0.01
MN19	1.86	1.86	1.86	0.01	0.01
MN27	0.96	0.96	0.96	0.01	0.01
MN33	1.18	1.18	1.18	0.80	0.80
MN35	1.29	1.29	1.29	0.01	0.01
MN37	29.10	29.10	29.10	0.01	0.01
MN38	1.57	1.57	1.57	0.61	0.62
MN44	0.70	0.70	0.70	0.38	0.39
MN45	0.47	0.47	0.47	0.01	0.01

Analysis begun on: Fri Jun 17 11:04:45 2016

Analysis ended on: Fri Jun 17 11:06:35 2016

Total elapsed time: 00:01:50